



Florentin Smarandache

Toward a New Paradigm^{essays}

Insights into Neutrosophic Philosophy

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Some of the articles in this volume have been previously published in various journals, while certain ideas and connections from other articles have appeared, in more or less developed forms, in my other volumes—for example, in the *Scilogs* series.

Neutrosophic Philosophy. A New Paradigm of Thought

In a world where contradictions and uncertainties define our existence, traditional philosophical paradigms often fall short of capturing the full complexity of reality. **Neutrosophic Philosophy**, an innovative and expansive intellectual framework, seeks to bridge these gaps by embracing indeterminacy, paradox, and the interplay between opposites and neutralities. This philosophical system extends beyond classical dialectics and binary reasoning, offering a more nuanced approach to logic, epistemology, and ontology.

This book presents an exploration of Neutrosophic Philosophy, integrating its foundational principles, logical extensions, and interdisciplinary applications. At its core, Neutrosophy investigates the continuum of neutralities, the equilibrium of ideas, and the dynamic interplay of thesis, antithesis, and neutrothesis—*fundamentally redefining how knowledge is structured and interpreted*. Unlike traditional logic, which relies on absolute truths and falsehoods, Neutrosophy introduces the concept of degrees of truth, falsity, and indeterminacy, making it a powerful tool for understanding complex and evolving systems.

Expanding the Boundaries of Thought

By challenging and reframing conventional philosophical structures, Neutrosophic Philosophy offers a radical shift in perspective. It incorporates elements of many-valued logics, transdisciplinary methodologies, and mathematical formalization, ensuring that the philosophy remains both rigorous and adaptable.

Key areas of exploration include:

- **The Foundations of Neutrosophy:** Understanding stability and instability, referential relativity, and the principles that govern neutrosophic thought.

Toward a New Paradigm

Insights into Neutrosophic Philosophy

- **Mathematization of Philosophy:** Investigating how mathematical structures and logical pluralism can be applied to philosophical inquiry.
- **Beyond Classical Logic:** Introducing concepts such as the Law of Included Infinitely-Many-Middles, Upside-Down Logics, and the falsification/truthification dynamic.
- **Social and Scientific Applications:** Exploring the role of Neutrosophy in fields like quantum mechanics, artificial intelligence, sociology, literature, and ethics.
- **Neutrosophic Social Evolution and Materialism:** Extending traditional dialectical materialism by incorporating degrees of evolution, involution, and indeterminacy in societal structures.
- **Neutrosophy and Infinity:** A deep dive into the concept of infinity from a neutrosophic perspective, reconciling philosophical and mathematical interpretations.
- **Transdisciplinarity and Multi-Space Thinking:** Bridging disciplines and introducing multi-structured, multi-layered realities to better understand knowledge and existence.

A Transformative Approach to Reality

The relevance of Neutrosophic Philosophy extends far beyond abstract theory. By applying its principles to real-world issues—ranging from ethical dilemmas and cognitive-behavioral therapy to historical revisionism and social norms—it provides a framework for analyzing and addressing the uncertainties of modern life. The philosophy's inherent flexibility allows it to evolve alongside contemporary scientific advancements and societal shifts, making it a dynamic and ever-relevant school of thought.

Whether one seeks to reinterpret paradoxes, construct new ontological models, or explore the infinite nature of truth, this book serves as both a theoretical foundation and a practical guide. It invites scholars, researchers, and thinkers from diverse disciplines to engage with Neutrosophic Philosophy, challenging them to embrace ambiguity, reconsider the limits of logic, and adopt a more holistic approach to knowledge and existence.

An Invitation to a New Intellectual Frontier

Neutrosophic Philosophy is not merely an extension of classical thought; it is an invitation to reimagine the nature of reality itself. It calls for a departure from rigid binaries, urging a deeper engagement with the indeterminate and the paradoxical.

By integrating logic, mathematics, and philosophical inquiry, it offers a transformative lens through which we can better navigate the uncertainties of the modern world.

As humanity continues to confront complex challenges that defy simplistic solutions, Neutrosophy stands as a beacon of intellectual expansion, guiding us toward a more comprehensive and inclusive understanding of truth, existence, and the interplay of knowledge systems. This book is a step toward that future—one where contradiction and neutrality are not barriers to understanding but rather pathways to deeper insight.

Keywords

- **Neutrosophy**, Neutrosophic Logic, Indeterminacy, Neutrality, Neutrosophic Set, Neutrosophic Probability
- **Dialectics**, Trialectics, Transdisciplinary Philosophy, Transdisciplinary Knowledge, Interdisciplinary Interactions
- **Paradox**, Paradoxism, Contradiction, Complementarity, Ambiguity, Vagueness, Uncertainty
- **Logical Pluralism**, Multi-Valued Logic, Paraconsistent Logic, Dialetheism, Fuzzy Logic, Beyond Binary Reasoning
- **Mathematization of Philosophy**, Formal Systems, Bayesian Epistemology, Decision Theory, Game Theory, Gödel's Incompleteness Theorems
- **Neutrosophic Sociology**, Social Phenomena, Social Complexity, Social Change, Political Movements, Sociological Forecasting
- **Philosophy of Logic**, Classical Logic, Non-Classical Logics, Philosophy of Contradiction, Philosophical Diversity
- **Quantum Mechanics**, Heisenberg Uncertainty Principle, Superposition, Quantum Entanglement, Probabilistic Systems
- **Artificial Intelligence**, Machine Learning, Neural Networks, Natural Language Processing, Handling Ambiguity in AI
- **Infinity**, Transfinite Numbers, Paradoxes of Infinity, Mathematical Ontology, Dynamic Knowledge Systems
- **Hermeneutics**, Ontology, Metaphysics, Ethical Decision-Making, Thought Experiments, Conceptual Innovation
- **Materialism**, Dialectical Materialism, Historical Materialism, Capitalism, Communism, Socialism, Hybrid Systems
- **Existentialism**, Philosophical Movements, Phenomenology, Body-Mind Problem, Cognitive Pluralism, Speculative Reasoning
- **Zoroastrianism**, Zarathustra, Ahura Mazda, Dharma, Karma, Gilgamesh, Dharma, Adharma, Karma, Diamond Sutra, Chinvat bridge

The Foundations of Neutrosophy

Neutrosophy emerges as a revolutionary branch of philosophy, offering a framework for understanding the origin, nature, and interactions of neutralities. It seeks to observe the sophisticated spaces between binaries, to interpret the uninterpretable, and to generalize classical ideas into broader, more encompassing principles. Through its methods, principles, and theses, neutrosophy confronts the pervasive indeterminacy of the world, reconsidering the nature of truth, falsity, and the vast spectrum of neutrality that lies between.

Neutrosophy, Neutrality, Indeterminacy, Neutrosophic Logic, Duality, Complementarity, Paradox, Dialectics, Transdisciplinary Philosophy, Thesis, Antithesis, Neutrothesis, Neutrosynthesis.

Neutrosophy, a philosophical framework that I developed more than two decades ago [Smarandache 1998], explores the relationships and interactions between opposites and their neutralities/indeterminacies, seeking to find commonalities between them and identifying uncommon elements within similar entities, emphasizing the complexity and interconnectedness of concepts. Neutrosophy transcends traditional binary thinking by examining the interaction between opposites and the neutralities/indeterminacies between them. Neutrosophy challenges conventional modes of thought by proposing new philosophical principles and methods that recognize the limitations of classical systems. This mode of thinking is characterized by several key features. Let us review them.

Reframing Old Concepts

Neutrosophy revisits traditional ideas, claiming that truths within one referential system may become falsehoods in another, and vice versa. This approach underscores the fluidity of knowledge, urging to view ideas from multiple angles.

Toward a New Paradigm

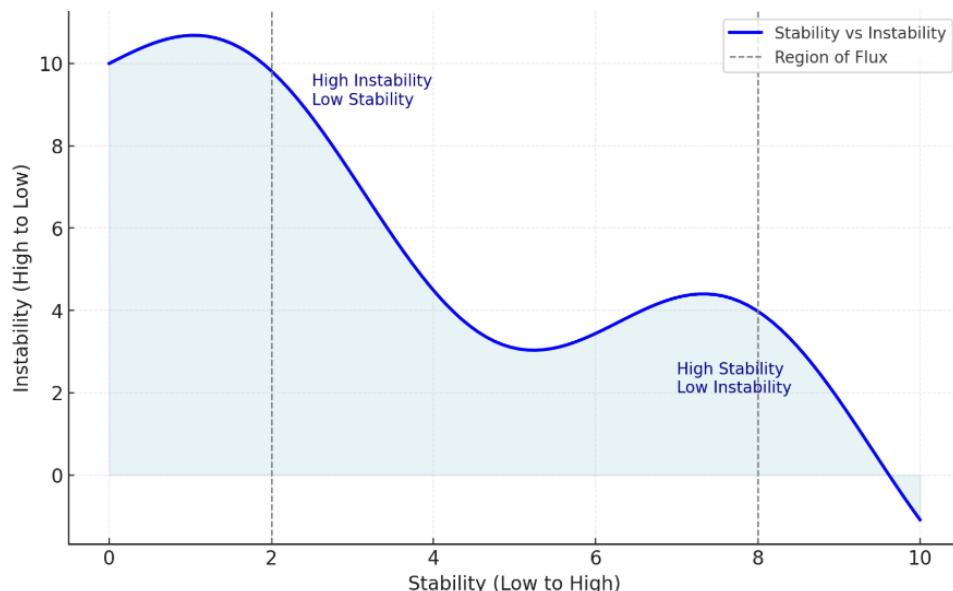
Insights into Neutrosophic Philosophy

By delving into the domains of paradox and ambiguity, neutrosophy illuminates areas of thought previously deemed inaccessible or contradictory.

Neutrosophy attempts to reconcile opposing ideas by uncovering the neutral spaces between them. It aims to “make peace in the war of ideas and make war in the peaceful ideas,”¹ emphasizing the dynamic nature of thought.

Understanding Stability and Instability

By measuring the stability of unstable systems and the instability of stable systems, neutrosophy offers tools to analyze and navigate systems marked by flux and uncertainty.



Graph 1. The relationship between stability and instability

The x -axis represents stability (low to high).

The y -axis represents instability (high to low).

The curve showcases how instability decreases as stability increases, with regions of flux and uncertainty emphasized.

Methods of Neutrosophic Study

Neutrosophy employs a rich array of methods, blending formal rigor with transdisciplinary approaches.

These include:

¹ Smarandache, Florentin (2002). “Neutrosophy, A New Branch of Philosophy.” *Multiple Valued Logic / An International Journal*, 3, p. 16. Available online: https://digitalrepository.unm.edu/math_fsp/24. Accessed: 29 December 2024.

- **Mathematization:** Incorporating concepts like neutrosophic logic, probability, and duality to quantify and model neutrality.
- **Generalization and Complementarity:** Extending classical notions to encompass a broader spectrum of possibilities and recognizing the interconnectedness of opposites.
- **Contradiction and Paradox:** Embracing the coexistence of opposing truths to uncover deeper insights.
- **Transdisciplinarity:** Applying neutrosophic principles across diverse fields, from physics and philosophy to psychology and literature.

Formalization: Defining Neutralities

Neutrosophy formalizes its approach through a precise system of notation.²

Let's denote by $[A]$ an idea, or proposition, theory, event, concept, entity, by $[Non-A]$ what is not $[A]$, and by $[Anti-A]$ the opposite of $[A]$. Also, $[Neut-A]$ means what is neither $[A]$ nor $[Anti-A]$, i.e., neutrality in between the two extremes. And let $[A']$ be a version of $[A]$.

Of course, $[Non-A]$ is different from $[Anti-A]$.

For example:

If $[A]$ = white, then $[Anti-A]$ = black (antonym), but $[Non-A]$ = green, red, blue, yellow, black, etc. (any color, except white), while $[Neut-A]$ = green, red, blue, yellow, etc. (any color, except white and black), and $[A']$ = dark white, etc. (any shade of white).

In a classical way:

$[Neut-A] = [Neut-(Anti-A)]$, i.e., neutralities of $[A]$ are identical with neutralities of $[Anti-A]$.

Also:

$[Non-A] \supset [Anti-A]$, and $[Non-A] \supset [Neut-A]$ as well.

$[A] \cap [Anti-A] = \emptyset$, $[A] \cap [Non-A] = \emptyset$.

$[A]$, $[Neut-A]$, and $[Anti-A]$ are disjoint two by two.

$[Non-A]$ is the completeness of $[A]$ with respect to the universal set.

But, since in many cases the borders between notions are vague, imprecise, it is possible that $[A]$, $[Neut-A]$, $[Anti-A]$ (and $[Non-A]$ of course) have common parts two by two.

² Smarandache, Florentin (2002). *Idem*, p. 17.

Principles and Laws of Neutrosophy

Continuum of Neutralities

Between any idea and its opposite lies an infinite spectrum of neutralities, reflecting the gradations and transitions that characterize real-world phenomena.

Referential Relativity

The truth, falsity, and indeterminacy of any proposition depend on the referential system in which it is examined. In one system, a proposition may appear true; in another, false; and in yet another, indeterminate.

Equilibrium of Ideas

Every idea naturally tends toward equilibrium, balanced not only by opposing ideas but also by the neutral ideas between them. (This principle expands Hegel's dialectical synthesis by recognizing the role of neutralities.)

Thesis-Antithesis-Neutrothesis, and Neutrosynthesis

In neutrosophy, $[A]$, $[\text{anti}A]$, and $[\text{neut}A]$ combined two by two, and also all three of them together form the NeutroSynthesis. Neutrosophy establishes the universal relations between $[A]$, $[\text{anti}A]$, and $[\text{neut}A]$.

$[A]$ is the thesis, $[\text{anti}A]$ the antithesis, and $[\text{neut}A]$ the neutrothesis (neither $[A]$ nor $[\text{anti}A]$, but the neutrality in between them).

In the neutrosophic notation, $[\text{non}A]$ (not $[A]$, outside of $[A]$) is the union of $[\text{anti}A]$ and $[\text{neut}A]$.

$[\text{neut}A]$ may be from no middle (excluded middle), to one middle (included middle), to many finite discrete middles (finite multiple included-middles), and to an infinitude of discrete or continuous middles (infinite multiple included-middles) [e.g., as in color for the last one, let's say between black and white there is an infinite spectrum of middle/intermediate colors].

Thesis, Antithesis, Synthesis

Neutrosophy is a generalization of dialectics (which is based on contradictions only, $[A]$ and $[\text{anti}A]$), because neutrosophy is based on contradictions and on the neutralities between them ($[A]$, $[\text{anti}A]$, and $[\text{neut}A]$).

Therefore, the dialectical triad thesis-antithesis-synthesis³ is extended to the neutrosophic tetrad thesis-antithesis-neutrothesis-neutrosynthesis. I do this not for the sake of generalization, but for better reflecting our world. A neutrosophic synthesis (neutrosynthesis) is more refined than the dialectical synthesis. It carries on the unification and synthesis regarding the opposites and their neutrals too.

Neutrosophic Dynamicity

I have extended the Principle of Dynamic Opposition [opposition between $[A]$ and $[antiA]$] to the Principle of Dynamic Neutroposition — which means oppositions among $[A]$, $[antiA]$, and $[neutA]$. Etymologically “neutroposition” means “neutrosophic opposition”.⁴

This reasoning style is not a neutrosophic scheme, but it is based on reality, because if an idea (or notion) $[A]$ arises, then multiple versions of this idea are spread out, let's denote them by $[A]_1$, $[A]_2$, ..., $[A]_m$. Afterwards, the opposites (in a smaller or higher degree) ideas are born, as reactions to $[A]$ and its versions $[A]_i$. Let's denote these versions of opposites by $[antiA]_1$, $[antiA]_2$, ..., $[antiA]_n$. The neutrality $[neutA]$ between these contradictions ideas may embrace various forms, let's denote them by $[neutA]_1$, $[neutA]_2$, ..., $[neutA]_p$, where m, n, p are integers greater than or equal to 1.

In general, for each $[A]$ there may be corresponding many $[antiA]$'s and many $[neutA]$'s. Also, each $[A]$ may be interpreted in many different versions of $[A]$'s too.

Neutrosophic Dynamicity means the interactions among all these multi-versions of $[A]$'s with their multi- $[antiA]$'s and their multi- $[neutA]$'s, which will result in a new thesis, let's call it $[A']$ at a superior level. And a new cycle of $[A']$, $[antiA']$, and $[neutA']$ restarts its neutrosophic dynamicity.

³ The classical reasoning development about evidences, popularly known as thesis-antithesis-synthesis from dialectics, is attributed to the philosopher Georg Wilhelm Friedrich Hegel (1770-1831) and later it was used by Karl Marx (1818-1883) and Friedrich Engels (1820-1895). About thesis and antithesis have also written Immanuel Kant (1724-1804), Johann Gottlieb Fichte (1762-1814), and Thomas Schelling (born 1921). While in ancient Chinese philosophy the opposites *yin* [feminine, the moon] and *yang* [masculine, the sun] were considered complementary.

⁴ Smarandache, Florentin (2015). "Thesis-Antithesis-Neutrothesis and Neutrosynthesis." *Neutrosophic Sets and Systems* 8, p. 57. Available online: https://digitalrepository.unm.edu/nss_journal/vol8/iss1/9. Accessed: 29 December 2024.

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Practical Example

Consider a scenario where $[A]$ represents a country engaged in war with another country, which we can label $[antiA]$ due to its antagonistic stance against $[A]$. Meanwhile, a group of neutral countries, referred to as $[neutA]$, may intervene in the conflict, either by supporting or opposing one of the warring parties to varying extents.

Some of these neutral countries ($[neutA]$) might remain entirely neutral throughout the war. However, there is an ongoing interplay among the three groups— $[A]$, $[antiA]$, and $[neutA]$ —as countries may switch allegiances (moving from one coalition to another) or withdraw from any coalition altogether.

This simplified example highlights the often-overlooked role of $[neutA]$ in the conflict between opposing forces, $[A]$ and $[antiA]$, a role that traditional dialectical frameworks fail to address. As a result, the dialectical synthesis is expanded into a broader concept known as neutrosynthesis, a neutrosophic approach that integrates thesis, antithesis, and neutrothesis.

Theoretical Example

Imagine $[A]$ as a philosophical school, with $[antiA]$ representing its opposing school of thought. In the debate between $[A]$ and $[antiA]$, philosophers from both conflicting sides may draw upon ideas from various neutral philosophical schools ($[neutA]$)—schools that are neither aligned with $[A]$ nor with $[antiA]$ —to strengthen their arguments against the opposing view.

Applications of Neutrosophy

Neutrosophy's principles find resonance across multiple disciplines. Let us pick some of them.

Quantum Mechanics

The uncertainty inherent in quantum systems aligns with the neutrosophic view. Instead of seeking deterministic probabilities, neutrosophy allows us to model quantum states as a blend of truth, falsity, and indeterminacy, capturing the ambiguous nature of phenomena like superposition.

Artificial Intelligence

Neutrosophic logic enhances AI by enabling systems to reason with incomplete, contradictory, or uncertain information, improving decision-making processes and adaptability.

Philosophy and Sociology

By exploring the interplay of ideas and their opposites, neutrosophy fosters dialogue and understanding in fields where competing ideologies often clash.

Literature and Art

Neutrosophy offers tools to interpret the layers of meaning in creative works, where ambiguity and paradox are often central themes.

Toward a Philosophy of Balance

Neutrosophy represents not just a theoretical framework but a movement that redefines how we approach knowledge and understanding. It invites us to embrace ambiguity, to explore the spaces between extremes, and to recognize the interplay of opposites and neutralities. By formalizing and extending classical ideas, neutrosophy provides a lens through which to reinterpret the complexities of the world. In a world marked by indeterminacy, neutrosophy offers a path forward. It challenges us to transcend binary thinking, to explore the continuum of possibilities between extremes, and to seek balance in the face of complexity. Neutrosophy is not merely a study of neutrality but a call to action—a call to rethink, reinterpret, and redefine our understanding of truth, falsity, and the vast spectrum of neutrality in between.

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Common Parts to Uncommon Things and Uncommon Parts to Common Things

Let $[A]$ be an item, concept, idea, proposition, school of thought, current, theory, etc. and $[antiA]$ be the opposite of $[A]$. Analogously for $[B]$ and its opposite $[antiB]$. Neutrosophy means to find:

- (i) common parts to uncommon things (that is, $[A]$ and $[antiA]$ have something in common, or their intersection $[A] \cap [antiA]$ is not empty), and vice versa;
- (ii) uncommon parts to common things (the two equal items $[A]=[B]$ have also uncommon parts, either $[A] \cap [antiB]$ is not empty, or $[antiA] \cap [B]$ is not empty).

Both, the *Common Parts to Uncommon Things*, and the *Uncommon Parts to Common Things*, end up being parts of indeterminacy / neutrality situated between the opposites: denoted by $[neutA]$, which means neither $[A]$ nor $[antiA]$, but in between them; and respectively by $[neutB]$, which similarly means neither $[B]$ nor $[antiB]$, but in between them.¹

Neutrosophy, Paradoxism, Dialectics, Psychoanalysis, Democracy, Alchemy, Science, Structuralism, Post-Structuralism, Paradoxical Intention, Pro-choice, Pro-life, Cognitive-Behavioral Therapy, Psychodynamic Therapy.

Neutrosophy is an extension of the *Paradoxism* in literature/arts/science/philosophy, *Dialectics*, and *Yin Yang Ancient Chinese Philosophy*², which took into consideration the dynamics between the opposites only, while omitting their neutralities/indeterminacies that play an important role in the balance between opposites. By identifying and studying common parts in uncommon things and uncommon parts in common things, neutrosophy reveals the complexity and interconnectedness inherent in various ideas and phenomena.

¹ This is an improved version of the paper: Smarandache, Florentin (2024). "Neutrosophy means: Common Parts to Uncommon Things and Uncommon Parts to Common Things." *Neutrosophic Sets and Systems* 68, 1-7. https://digitalrepository.unm.edu/nss_journal/vol68/iss1/1

² Britannica, The Editors of Encyclopaedia. "yinyang". Encyclopedia Britannica, 12 Feb. 2024, <https://www.britannica.com/topic/yinyang>. Accessed 30 May 2024.

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I shortly present here two core principles of neutrosophic research in soft sciences, then exemplifies these neutrosophic principles, and suggests applications.

Two Neutrosophic Core Principles

Searching for Common Parts in Uncommon Things

This principle posits the study of opposing concepts that share (some) common elements.

For example:

Political Ideologies: *Capitalism*³ [Hickel] and *Socialism*⁴ [Cole] both pretend their aim to be the improvement of societal welfare and economic prosperity, though their proposed methods differ.

Psychological Theories: Freud's *Psychoanalysis*⁵ [Freud] and Jung's *Analytical Psychology*⁶ [Jung] both focus on the unconscious mind but having distinct theoretical foundations and methodologies.

Searching for Uncommon Parts in Common Things

This principle propounds the research of similar or equivalent concepts containing elements that are distinct or oppositional.

Forms of Governance: *Democracy*⁷ and *Representative Democracy*⁸ both emphasize the role of the people, yet representative democracy involves elected officials, while direct democracy involves direct citizen participation. [Landemore]

³ Britannica, The Editors of Encyclopaedia. "What is capitalism?". Encyclopedia Britannica, 24 Feb. 2023, <https://www.britannica.com/question/What-is-capitalism>. Accessed 27 May 2024.

⁴ Britannica, The Editors of Encyclopaedia. "What is socialism?". Encyclopedia Britannica, 11 Apr. 2022, <https://www.britannica.com/question/What-is-socialism>. Accessed 27 May 2024.

⁵ Jay, Martin Evan. "Sigmund Freud". Encyclopedia Britannica, 20 May. 2024, <https://www.britannica.com/biography/Sigmund-Freud>. Accessed 28 May 2024.

⁶ Fordham, Frieda. "Carl Jung". Encyclopedia Britannica, 18 Mar. 2024, <https://www.britannica.com/biography/Carl-Jung>. Accessed 28 May 2024.

⁷ Shapiro, Ian, Dahl, Robert A. and Froomkin, David. "democracy". Encyclopedia Britannica, 6 May. 2024, <https://www.britannica.com/topic/democracy>. Accessed 29 May 2024.

⁸ Raikar, Sanat Pai. "representative democracy". Encyclopedia Britannica, 29 Feb. 2024, <https://www.britannica.com/topic/representative-democracy>. Accessed 29 May 2024.

Forms of Thinking: *Empiricism* [Gupta] vs. *Alchemy* [Ferguson]: Both seek understanding of the world, but *alchemy*⁹ lacks the methodology and empirical support of *science*.¹⁰

Investigation in Soft Sciences

Hegelian Dialectics

In Hegelian *Dialectics*,¹¹ ideas and reality develop through the interaction of opposites. An initial idea (*thesis*) is countered by an opposing idea (*antithesis*), leading to a resolution (*synthesis*) that integrates elements of both. [Hegel]

Structuralism and Post-Structuralism

These theories explore the so-called construction and de-construction of meaning.

Structuralism: Lévi-Strauss examines how elements within a culture or system are interrelated. [Lévi-Strauss]

Post-Structuralism: Derrida focuses on the instability of these structures, emphasizing the gaps or the contradiction in meaning and interpretation. [Derrida]

Social Systems Theory

Systems Theory in Sociology looks at how different parts of a system interact and form a whole. For example, Luhmann views society as a complex set of communications and interactions, where even opposing elements are part of the system's overall functioning. [Luhmann]

Paradoxical Intention

In Psychology, the *Paradoxical Thinking* [Frankl] involves recognizing and integrating contradictory thoughts or behaviors. The method encourages patients to actively engage in the very behaviors they fear, in order to reduce the anxiety associated with those.

⁹ Britannica, The Editors of Encyclopaedia. "alchemy (pseudoscience)". Encyclopedia Britannica, 29 Mar. 2024, <https://www.britannica.com/topic/alchemy>. Accessed 29 May 2024.

¹⁰ Britannica, The Editors of Encyclopaedia. "science". Encyclopedia Britannica, 25 May. 2024, <https://www.britannica.com/science/science>. Accessed 29 May 2024.

¹¹ Knox, T. Malcolm. "Georg Wilhelm Friedrich Hegel". Encyclopedia Britannica, 23 Apr. 2024, <https://www.britannica.com/biography/Georg-Wilhelm-Friedrich-Hegel>. Accessed 29 May 2024.

Applications in Contemporary Contexts

Migrations: Acculturation

In today's Western multicultural societies [Vani, Mangan], shared values of locals coexist with the unique and different cultural practices of migrants, leading to various individual outcomes. [Berry] *Acculturation*,¹² which results from intercultural contact, offers four different outcomes in varying degrees: integration, assimilation, separation, and marginalization.

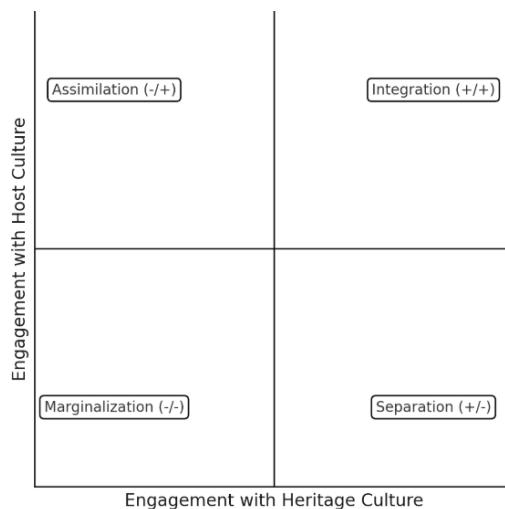
Let us apply a neutrosophic framework (Degrees of Engagement):

Integration (two-way exchange process) involves engaging with and identifying with both cultures.

Assimilation (one-way exchange process) entails adopting the host country's culture while rejecting one's heritage culture.

Separation (zero-way exchange process) involves identifying with one's heritage culture and interacting solely with one's own group.

Marginalization (minus-way exchange process) represents a (quasi)total lack of identification with both cultures.



Graph 2. Acculturation framework (neutrosophic model)

The *x*-axis represents the Degree of Engagement with Heritage Culture.

The *y*-axis represents the Degree of Engagement with Host Culture.

This graph represents the four acculturation strategies within a neutrosophic framework.

¹² Berry J. W. (1990). "Psychology of acculturation." In J. Berman (Ed.), "Cross-cultural perspectives: Nebraska Symposium on Motivation", Vol. 37, 201–234. Lincoln: University of Nebraska Press.

Considering the growing significance of global migrations, and the pivotal role workplace integration plays in adaptation, there's a pressing need for focus on the socialization process¹³ of migrants within organizations, not only in culture.¹⁴

One could expand upon Benson's approach [Benson], which is rooted in a dynamic understanding that an organization is shaped by historical processes of social construction, which is in constant move. Benson formalized¹⁵ four key principles of analysis (social construction, context, contradiction, and praxis), which - with neutrosophy as tool - can each be further subdivided into various facets.

In any cross-cultural process, a meta-analysis of adjustment processes is necessary,¹⁶ and an insightful instrument is provided by a neutrosophic standpoint that could uncover various factors, in the given case - factors that could alleviate the inequalities migrants encounter in socialization.

Ethics: Pro-choice vs. Pro-life

The Pro-choice and the Pro-life options are two contradictory viewpoints, mostly reduced to a total opposition. A neutrosophic view over their shared goals might suggest a possible foundation for constructive dialogue and collaborative efforts.

Pro-choice movement

The *Pro-choice* movement can be traced back to the early 20th century, with activists like Margaret Sanger advocating for women's access to contraception, and founding the American Birth Control League¹⁷ in 1921. Around 1970, significant legal challenges and efforts emerged to reform restrictive abortion laws in the United States. Organizations such as the National Association for the Repeal of Abortion Laws [NARAL], founded in

¹³ McGahan A. M. (2020). "Immigration and impassioned management scholarship." *Journal of Management Inquiry* 29(1), 111-114. <https://doi.org/10.1177/1056492619877617>

¹⁴ Omanović, V., & Langley, A. (2023). "Assimilation, Integration or Inclusion? A Dialectical Perspective on the Organizational Socialization of Migrants." *Journal of Management Inquiry* 32(1), 76-97. <https://doi.org/10.1177/10564926211063777>

¹⁵ Benson J. K. (1983). "A dialectical method for the study of organizations." In Morgan G. (Ed.), "Beyond method: Strategies for social research", Sage Publications, 331-346.

¹⁶ Nguyen, A.-M. T.D., Benet-Martínez, V. (2018). "Biculturalism and adjustment: A meta-analysis." *Journal of Cross-Cultural Psychology* 44(1), 122-159. DOI: 10.1177/0022022111435097.

¹⁷ Moses, Theodora R. "American Birth Control League". Encyclopedia Britannica, 20 Mar. 2023, <https://www.britannica.com/topic/American-Birth-Control-League>. Accessed 29 May 2024.

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1969, were instrumental in advocating for women's right to choose. The pivotal moment for the Pro-choice movement came with the Supreme Court case Roe v. Wade¹⁸, which extended the constitutional right to privacy to a woman's decision to have an abortion, decision that galvanized Pro-choice and Pro-life activists. Today, the Pro-choice movement often intersects with other social movements, including LGBTQ+ rights.

Pro-life movement

The *Pro-life* movement originated in Catholic opposition to Pro-choice movement in the 1950s [Munson]. In response to the growing feminist movement and efforts to liberalize abortion laws, Pro-life groups formed structured organizations, e.g. National Right to Life Committee in 1968 [NRLC]. In the years following Roe v. Wade trial, the Pro-life movement expanded its strategies to include lobbying for restrictive abortion laws, dismantled for a moment by a new Supreme Court decision in the case Planned Parenthood v. Casey.¹⁹ The Pro-life movement gained lately significant political influence. While primarily focused on abortion, the Pro-life movement often intersects with other conservative causes, including opposition to euthanasia.

In search of a common ground

Finding common ground between the *Pro-choice* and *Pro-life* positions²⁰ can be challenging due to their fundamentally opposing views on abortion. However, both sides can agree on the following statements: [Spitzer et al.]

- Both can support measures to reduce unintended pregnancies, such as comprehensive sex education and increased access to contraception.
- Both can encourage adoption as a viable option for women who do not wish to or cannot raise a child,
- Both can approve making the adoption process easier, affordable, less stigmatized.

¹⁸ Roe v. Wade, 410 U.S. 113 (1973). <https://supreme.justia.com/cases/federal/us/410/113/>.

¹⁹ Planned Parenthood of Southeastern Pa. v. Casey, 505 U.S. 833 (1992), [https://supreme.justia.com/cases/federal/us/505/833/..](https://supreme.justia.com/cases/federal/us/505/833/)

²⁰ Britannica, The Editors of Encyclopaedia. "Pro and Con: Abortion". Encyclopedia Britannica, 27 Dec. 2021, <https://www.britannica.com/story/pro-and-con-abortion>. Accessed 29 May 2024.

- Both can agree on the importance of supporting women and families, meaning: better access to healthcare, longer parental leave, more affordable childcare.
- Both can agree on the importance of protecting women's safety.
- Both can work towards improving educational and economic opportunities for women, to empower choices about their reproductive lives.

Psychology: Cognitive-Behavioral Therapy vs. Psychodynamic Therapy

Cognitive-Behavioral Therapy²¹ (CBT) focuses on present thoughts and behaviors, while *Psychodynamic Therapy²²* (PDT) explores unconscious processes and past experiences — both approaches aiming to alleviate psychological distress.

Although both therapies appear effective in addressing mental health concerns, they diverge in their theoretical orientations, goals, techniques, and duration. However, they can also complement each other when used together.

Let us engage in a quick comparison:

Basics

- Rooted in the cognitive model, CBT focuses on the relationship between thoughts, feelings, and behaviors. It emphasizes identifying and challenging negative or maladaptive thought patterns and replacing them with more adaptive ones. *CBT is present-focused and goal-oriented.*
- Based on psychoanalytic principles, psychodynamic therapy explores how unconscious conflicts and early life experiences influence current thoughts, feelings, and behaviors. It aims to bring unconscious material into conscious awareness to promote insight and healing. *Psychodynamic therapy tends to be exploratory and insight-oriented.*

²¹ Moulds, M., Grisham, J., & Graham, B. (2022). "Cognitive Behavioral Therapy for Anxiety." *Oxford Research Encyclopedia of Psychology*. Retrieved 29 May. 2024, from <https://oxfordre.com/psychology/view/10.1093/acrefore/9780190236557.001.0001/acrefore-9780190236557-e-331>.

²² Crits-Christoph, P. (1992). "The efficacy of brief dynamic psychotherapy: A meta-analysis." *American Journal of Psychiatry* 149(2):151–158.

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Therapeutic Techniques

- Techniques in CBT include cognitive restructuring,²³ behavioral experiments, exposure therapy,²⁴ and skill-building exercises such as relaxation and problem-solving techniques.
- PDT techniques include free association,²⁵ dream analysis, interpretation of transference and countertransference, and exploring childhood experiences and relationships with significant others.

Therapeutic Relationship

- The therapist and patient work together to set specific goals, and actively engage in homework assignments between sessions in CBT.
- In PDT, the therapist serves as a neutral interpreter and guide, facilitating exploration of deeper emotions and conflicts.

Duration and Focus

- CBT is typically *short-term* (from a few weeks to several months) and focused on addressing specific symptoms or problems.
- PDT is usually *longer-term* (lasting several months to years) and focuses on exploring underlying emotional issues and patterns.

Toward a Unified Epistemology

Neutrosophy offers a framework for understanding the wide interactions and the inébranlable connections of some concepts traditionally seen as opposites and their neutralities/ indeterminacies. By applying this framework to the soft sciences, one gain deeper insights into the nuanced relationships between ideas, theories, and practices. This approach can lead to an integrative understanding of human knowledge and experience.

Neutrosophy transcends the limits and finds: common ideas to uncommon schools of thought, and reciprocally: uncommon ideas to common schools of thoughts.

²³ Identifying and challenging negative thoughts.

²⁴ Gradual exposure to feared stimuli.

²⁵ Encouraging clients to speak freely without censorship.

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The Mathematization of Philosophy. A Neutrosophic Perspective

The mathematization of philosophy represents a significant intellectual ambition to systematize and clarify the complexities of philosophical thought through mathematical formalism. Let us explore some efforts to mathematize philosophy across various domains, including logic, epistemology, ethics, metaphysics, and language. Furthermore, the neutrosophic framework—emphasizing the interconnection of truth, falsehood, and indeterminacy—offers a complementary approach to addressing the inherent ambiguities in philosophical inquiry.

Mathematization of Philosophy, Neutrosophy, Formal Systems, Logical Positivism, Bayesian Epistemology, Game Theory, Ethics, Decision Theory, Metaphysics, Modal Logic, Artificial Intelligence, Set Theory, Ontology, Mathematical Ontology, Truth, Indeterminacy, Uncertainty, Gödel's Incompleteness Theorems.

Philosophy has long grappled with the tension between precision and abstraction. While its richness lies in its exploration of nuanced, often ambiguous concepts, this very ambiguity poses challenges for clarity and systematic understanding. The ambition to mathematize philosophy seeks not to reduce its richness but to formalize its complexities, bringing clarity to its inherent interrelations.

Mathematization has its roots in the natural sciences, where phenomena were gradually expressed in mathematical terms. Philosophical mathematization follows a similar trajectory, applying formal tools to age-old questions about truth, existence, and morality. However, this effort is not without its limitations. *Neutrosophy extends the possibilities of mathematization by incorporating the spectrum of truth, falsehood, and indeterminacy*, thereby addressing philosophical ideas that resist strict formalization.

The Historical Foundations of Mathematization in Philosophy

Logic and Formal Systems

The mathematization of philosophy began with Aristotle's syllogistic logic, which systematized reasoning. Modern developments in symbolic logic, pioneered by Gottlob Frege,¹ Alfred North Whitehead,² and Bertrand Russell,³ extended this ambition, aiming to unify logic and mathematics.

Epistemology and Probability

In epistemology, the application of probability theory—exemplified by Bayesian epistemology⁴—formalizes reasoning under uncertainty. Bayesian frameworks provide a systematic way to update beliefs based on evidence, addressing questions of knowledge and justification with mathematical precision. Rudolf Carnap,⁵ a key figure in logical positivism, used formal tools to clarify philosophical questions about science and meaning.

Ethics and Decision Theory

Jeremy Bentham's⁶ utilitarian calculus introduced the idea of quantifying moral decisions by maximizing pleasure and minimizing pain.

¹ Zalta, Edward N., "Frege's Theorem and Foundations for Arithmetic", *The Stanford Encyclopedia of Philosophy* (Spring 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/spr2024/entries/frege-theorem/>. Accessed 21 September 2024.

² Desmet, Ronald and Andrew David Irvine, "Alfred North Whitehead", *The Stanford Encyclopedia of Philosophy* (Winter 2022 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/win2022/entries/whitehead/>. Accessed 21 September 2024.

³ Irvine, Andrew David, "Bertrand Russell", *The Stanford Encyclopedia of Philosophy* (Fall 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/win2024/entries/russell/>. Accessed 21 September 2024.

⁴ Lin, Hanti, "Bayesian Epistemology", *The Stanford Encyclopedia of Philosophy* (Summer 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/sum2024/entries/epistemology-bayesian/>. Accessed 21 September 2024.

⁵ Leitgeb, Hannes and André Carus, "Rudolf Carnap", *The Stanford Encyclopedia of Philosophy* (Fall 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/fall2024/entries/carnap>. Accessed 21 September 2024.

⁶ Plamenatz, John P. and Duignan, Brian. "Jeremy Bentham." *Encyclopedia Britannica*, 8 Jan. 2025, <https://www.britannica.com/money/Jeremy-Bentham>. Accessed 21 September 2024.

In the 20th century, John von Neumann and Oskar Morgenstern's⁷ game theory⁸ formalized rational decision-making, influencing moral and political philosophy.

These efforts illustrate the potential of mathematization to bring clarity to ethical dilemmas while raising questions about its applicability to subjective or indeterminate contexts.

Neutrosophy and the Limits of Mathematization

While mathematization offers precision and clarity, it often struggles with phenomena that resist strict formalization. Neutrosophy addresses this gap by introducing a triadic framework of truth (T), falsehood (F), and indeterminacy (I).

This approach acknowledges that philosophical concepts often exist within a spectrum of states rather than binary oppositions.

Truth as a Mathematical Entity

Mathematical formalism often treats *truth as an absolute*, yet neutrosophy suggests that truth is context-dependent and relational. For instance, Newtonian mechanics provides a mathematically coherent model of motion, yet its truths are refined by Einstein's theory of relativity in different contexts.

Indeterminacy and Ambiguity

Certain philosophical questions—such as those concerning consciousness or ethics—remain inherently indeterminate.

While mathematization seeks to quantify phenomena, neutrosophy embraces their ambiguity, allowing for the coexistence of multiple perspectives.

This approach is particularly relevant in areas like quantum mechanics, where indeterminacy is a fundamental feature of reality.

⁷ The seminal work in game theory is John von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behavior*, 3rd ed. (1953, reprinted 1980). Case studies in Avinash K. Dixit and Susan Skeath, *Games of Strategy* (1999); and Philip D. Straffin, *Game Theory* (1993).

⁸ Brams, Steven J. and Davis, Morton D.. "game theory". *Encyclopedia Britannica*, 21 Dec. 2024, <https://www.britannica.com/science/game-theory>. Accessed 7 February 2025.

Applications of Mathematization and Neutrosophy

Metaphysics and Modal Logic

In metaphysics, Gottfried Wilhelm Leibniz⁹ envisioned a “universal calculus” to resolve philosophical disputes through calculation. Modern modal logic, as developed by Saul Kripke,¹⁰ formalizes concepts like necessity and possibility, revolutionizing metaphysics and language philosophy. Neutrosophy extends these efforts by addressing the indeterminate states between necessity and contingency.

Mathematical Ontology and Set Theory

Alain Badiou’s integration of set theory into metaphysics exemplifies the use of mathematical structures to explore philosophical ideas. Drawing on Cantor’s concept of the empty set and the power set, Badiou demonstrates how reality always exceeds its formal representation.¹¹

Neutrosophy complements this view by highlighting the role of indeterminacy in such excesses.

Some philosophers, like Alain Badiou, directly integrate mathematics into metaphysical inquiries. Badiou uses set theory to articulate ideas about being and truth [Badiou 1998]. The French philosopher draws on mathematics to show that every system (social, political, or philosophical) is incomplete:¹² it relies on foundational voids (what’s excluded or missing) and creates excesses (elements that overflow its structure).¹³ Badiou reinterprets these Lacanian ideas [Lacan] using Cantor’s set theory.¹⁴

⁹ Belaval, Yvon and Look, Brandon C. “Gottfried Wilhelm Leibniz”. *Encyclopedia Britannica*, 6 Jan. 2025, <https://www.britannica.com/biography/Gottfried-Wilhelm-Leibniz>. Accessed 7 January 2025.

¹⁰ Soames, Scott and Duignan, Brian. “Saul Kripke”. *Encyclopedia Britannica*, 9 Nov. 2024, <https://www.britannica.com/biography/Saul-Kripke>. Accessed 7 February 2025.

¹¹ Bell, L. (2011). Articulations of the Real: from Lacan to Badiou. *Paragraph*, 34(1), 105–120. Available online: <http://www.jstor.org/stable/43263773>. Accesed: 29 November 2024.

¹² Badiou, Alain (1988). *L’être et l’événement*. Paris: Seuil. Available online: https://archive.org/details/trent_0116405721501/page/n579/mode/2up. Accesed: 12 mai 2024.

¹³ In Jacques Lacan’s terms, **void** represents the fundamental lack or absence (the **split subject** in psychoanalysis), the point where identity breaks down; and **excess** refers to what overflows or exceeds boundaries, such as unbridled language, desire, or sexuality, which goes beyond rationality or nature.

¹⁴ See Hosch, William L.. “Cantor’s theorem”. *Encyclopedia Britannica*, 15 Sep. 2016, <https://www.britannica.com/science/Cantors-theorem>. Accessed 29 November 2024.

Artificial Intelligence and Computational Philosophy

The mathematization of philosophy has found new relevance in artificial intelligence, where computational models formalize philosophical problems. For example, Daniel Dennett's work on the evolution of consciousness [Dennett 1991; Dennett 2017] uses mathematical and computational tools to model complex phenomena, yet these models must account for the indeterminacy and ambiguity inherent in human cognition—a challenge that neutrosophy addresses.

Case Studies: Neutrosophy in Practice

Quantum Mechanics and the Nature of Reality

Quantum mechanics, with its inherent probabilities and uncertainties, provides a fertile ground for applying neutrosophic logic. The Copenhagen interpretation, for example, suggests that quantum particles exist in a superposition of states until measured, at which point they “collapse” into a definite state. Neutrosophy can offer a framework for understanding this “in-between” state of superposition, not simply as a probabilistic mixture of definite states, but as a genuine indeterminate state. Furthermore, the concept of wave-particle duality, where particles exhibit both wave-like and particle-like behavior, can be analyzed through a neutrosophic lens. A particle might be considered “true” in its particle-like aspect, “false” in its wave-like aspect (as it's not localized), and “indeterminate” when it's in superposition, exhibiting neither behavior definitively. Neutrosophic logic could help refine our understanding of quantum phenomena, potentially leading to new interpretations and applications. For example, in quantum computing, the exploitation of superposition is crucial. Neutrosophy might offer new ways to manipulate these superpositions, potentially leading to more efficient quantum algorithms.

Social Sciences and Complex Systems

Social systems, such as economies, political systems, and social networks, are complex and often defy precise mathematical modeling. Traditional mathematical approaches often struggle with the inherent uncertainties, ambiguities, and contradictions that arise in human behavior and social interactions. For instance, consider economic forecasting. Traditional economic models may predict a specific growth rate, but these predictions are often based on simplified assumptions and fail to account for

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unforeseen events or shifts in consumer behavior. A neutrosophic approach would acknowledge the “truth” of the model's prediction under its given assumptions, the “falsehood” if those assumptions are flawed or if unexpected events occur, and the “indeterminacy” arising from the inherent complexity and unpredictability of the economic system. This framework can lead to make more informed predictions, not as absolute certainties, but as ranges of possibilities with associated degrees of truth, falsehood, and indeterminacy. Furthermore, in social network analysis, neutrosophy could be used to analyze the spread of information or influence, accounting for the fact that individuals may hold conflicting beliefs or be influenced by multiple sources, leading to indeterminate states of opinion or behavior.

Climate Modeling and Uncertainty

Mathematical models of climate change predict future scenarios with remarkable precision. Yet, these models are limited by their assumptions and uncertainties. A neutrosophic approach highlights the interplay of truth (*accurate predictions*), falsehood (*errors in assumptions*), and indeterminacy (*unknown variables*), fostering a more critical and adaptive understanding of environmental challenges.

Toward a Harmonization of Formal Systems

The mathematization of philosophy embodies a significant endeavor to formalize and elucidate philosophical inquiry, leveraging mathematical structures to uncover the intricate interconnections between concepts such as truth, morality, and existence. However, this approach faces inherent limitations, particularly when grappling with phenomena that resist quantification. Gödel's incompleteness theorems underscore the constraints of formal systems, while neutrosophy raises critical questions about the operationalization of indeterminacy. Its emphasis on context, ambiguity, and relationality highlights the importance of a broader, more adaptive perspective. As computational tools increasingly shape philosophical methodologies, the ethical and metaphysical implications of mathematization demand greater attention.

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Law of Included Infinitely-Many-Middles within the frame of Neutrosophy

I extend here the Law of Included Multiple-Middles to the Law of Infinitely-Many-Middles, and I present several practical applications. Also, I discuss Aristotle's Syllogism, Principle of Identity, and Principle of NonContradiction.

Excluded Middle; Included Middle; Included Multiple-Middles; Included Infinitely-Many-Middles; Syllogism; Many-Valued Syllogism; Identity; NonIdentity; NonContradiction, Anti-NonContradiction.

Let us briefly observe the evolution from the Law of Excluded Middle to the Law of Included Infinitely-Many-Multiples.¹

Law of Excluded Middle

The **Law of Excluded Middle** was enounced by the Ancient Greek philosopher Aristotle (384 -322 BC) on his opus on logic and reasoning [Aristotle] that was based on analysis and dichotomy:

“There cannot be an indeterminate between contraries, but of one subject we must either affirm or deny anyone predicate”.

Therefore, a proportion is either 100% true or 100% false, as in Boolean logic. Or, an element either belong 100% to a set, or does not belong 100% to the set (as in the classical set theory).

Law of Included Middle

The **Law of Included Middle** is the denial of previous, and it supports the idea that between contraries there may be a middle. It is based on trichotomy. Several philosophers and logicians developed it, such as Stephane Lupasco's logic of contradiction, using the non-standard logic, followed by Basarab Nicolescu's levels of reality, and J.-J. Wunenburger.

¹ A version of this paper, published in: Smarandache, Florentin (2023). “Law of Included Infinitely-Many-Middles within the frame of Neutrosophy.” *Neutrosophic Sets and Systems* 56, 1-4, https://digitalrepository.unm.edu/nss_journal/vol56/iss1/1

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Gonseth pleads for a low necessity in using the logic of contradiction. [Gonseth] With the introduction of modern sets and logics, such as fuzzy set/logic (Zadeh 1965), intuitionistic fuzzy set/logic (Atanassov 1983), neutrosophic set/logic/probability/statistics (Smarandache 1995), the Law of Included Middle became evident and useful in our everyday life where we deal with approximate partial membership/non-membership/truth/falsehood while in neutrosophic probability besides the chance of occurrence of an event, there has been added the middle term: indeterminate-chance of occurrence or not, and chance of non-occurrence.

Neutrosophic set and logic explicitly presented the *middle term "I"* (*indeterminacy or neutrality*) in between the opposite terms (membership/truth), and *F* (non-membership/falsehood).

Law of Included Multiple-Middles

The Law of Included Multiple-Middles is an extension of the previous, and I previously enounced [Smarandache 2014].

Neutrosophy is a branch of philosophy that studies the dynamics of the opposites $[A]$ and $[\text{anti}A]$ together with their neutrality $[\text{neut}A]$, where $[A]$ is an item (idea, proposition, theory, etc.), $[\text{anti}A]$ is its opposite, while $[\text{neut}A]$ is the neutrality in between them (i.e. neither $[A]$ nor $[\text{anti}A]$).

Of course, I am referring to the neutrosophic triads $[A]$, $[\text{neut}A]$, $[\text{anti}A]$ that make sense in our real world.

Neutrosophy, together with Neutrosophic Set/logic/probability, have been refined [Smarandache 2013], by refining splitting/multiplicating $[A]$, $[\text{neut}A]$, $[\text{anti}A]$ as follows:

$$\begin{aligned} [A] &\text{ as } [A_1], [A_2], \dots, [A_p]; \\ [\text{neut}A] &\text{ as } [\text{neut}A_1], [\text{neut}A_2], \dots, [\text{neut}A_r]; \\ [\text{anti}A] &\text{ as } [\text{anti}A_1], [\text{anti}A_2], \dots, [\text{anti}A_s]; \end{aligned}$$

where $p, r, s \geq 0$ are integers,

and at least one of p, r, s is ≥ 2 in order to ensure that at least one neutrosophic component amongst $[A]$, $[\text{neut}A]$, $[\text{anti}A]$ is refined/split/multiplicated.

This definition also permits the refinement of fuzzy set/logic (for $p \geq 2$ and $r = s = 0$), and of intuitionistic fuzzy set/logic (for $p \geq 1, r = 0, s \geq 1$ and at least one of p or s is ≥ 2).

By taking $p = 1, r \geq 2$, and $s = 1$, I defined the Law of Included Multiple-Middles:

Between the opposites $[A]$ and $[antiA]$ there are included multiple-middles: $[neutA_1], [neutA_2], \dots, [neutA_r]$.

It is of course based on a multichotomical analysis.

- Between the opposite colors White and Black there are many colors such as: yellow, rose, red, blue, etc.
- ii) Pentagonal Neutrosophic logic, where each proposition is characterized by five degrees of truth, such as (T, C, V, U, F) , where the opposites are:

T =degree of truth

and F =degree of falsehood,

and the three included-middles are:

C =degree of contradiction

V =degree of vagueness

U =degree of unknowingness

For example, the logical proposition:

P =Artificial intelligence will take over the world, evaluated by experts, this proposition may be 40% true (T), 20% contradictory (C), 30% vague (V), 60% unknown (U) and 50% false (F):

$P(0.4, 0.2, 0.3, 0.6, 0.5)$.

Law of Included Infinitely-Many-Middles

In between the opposites $[A]$ and $[antiA]$ there are infinitely many middles, denoted by

$[neutA_i]$, $i = 1, 2, \dots, \infty$.

i) Practical Example

Between the White and Black colors there are infinitely-many nuances of colors.

ii) Between 100% True and 100% False, there are included infinitely many middles, which are truth-values of the form: $d\%$ True and $(1-d)\%$ False, where $d \in (0, 1)$ thus a logical proposition may be, for example:

1% True and 99% False, 2% True and 98% False, etc.

iii) Similarly, between 100% membership and 100% non-membership, there are included infinitely many middles of the form: $d\%$ membership and $(1-d)\%$ non-membership.

Syllogism

Aristotle studied it:

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if “ $A \rightarrow B$ ” and “ $B \rightarrow C$ ” are totally true, then “ $A \rightarrow C$ ” is also totally true.
This is in classical logic.

Many-Valued Syllogism

In many-valued logics, where “ $A \rightarrow B$ ” and “ $B \rightarrow C$ ” are partially true, then “ $A \rightarrow C$ ” is partially true as well.

Principle of NonContradiction

It was enounced by Aristotle [1, 2], that $[A]$ and $[antiA]$ cannot be true at the same time:

“the same attribute cannot at the same time belong and not belong to the same subject and in the same respect”,

and:

“it is impossible for anyone to believe the same thing to be and not to be, as something Heraclitus says”.

Principle of Anti NonContradiction

I name this principle as “Anti Contradiction” that occur in the many-valued logics in order to distinguish it from the Principle of NonContradiction (also called Contradiction).

The above principle, related to the Law of Excluded Middle, does not work any longer in the modern theories. Again, with the introduction of modern set theories, it is possible to have both, degree of belonging and degree of not-belonging simultaneously of an element to a set, for example John (0.6, 0.4), meaning that John belongs (works) only 60% for his company and 40% does not. And similarly with respect to the modern logics, where a logical proposition may be partially true and partially false.

In fuzzy and fuzzy extension theories (except neutrosophic theories), $[A]$ and $[antiA]$ may be partially (not totally) true at the same time.

In fuzzy logic, if a proposition P is 50% true, then its negation $\neg P$ is also $100\%-50\% = 50\%$ true.

In neutrosophic logic, if a proposition has the truth-value P is $(a, 0.5, a)$, where $0 \leq a \leq 1$, then its negation $\neg P$ is also $(a, 1 - 0.5, a) = (a, 0.5, a)$.

In neutrosophic theories, $[A]$ and $[antiA]$ may be partially or totally true at the same time. For example, a paradox is proposition that is 100% true and 100% false at the same time, therefore $[A]$ and $[antiA]$ are totally true at the same time.

Principle of Identity

As enounced by Aristotle:

$A=A$ (an item is equal to itself).

This is true if one considers the item $[A]$ under the same parameters that characterize it, and having the same corresponding values:

$$A(P_1 = v_1, P_2 = v_2, \dots, P_n = v_n) = A(P_1 = v_1, P_2 = v_2, \dots, P_n = v_n).$$

Principle of NonIdentity

The Principle of Identity, by Aristotle, that $A = A$, works when the entity A is compared to itself with respect to the same parameters that characterize A , with each parameter measured at the same scale and on the same time.

But, if the parameters that characterize A are different, or their corresponding values are different, then one has non-equality.

For example, if $A=Andrew$, then $Andrew(\text{at age } 5) \neq Andrew(\text{at age } 70)$ physically, intellectually, and psychically.

As such, one may also define a Principle of NonIdentity, when A is different from A in at least one circumstance. And, in general, an item (person, animal, object, etc.) is not equal to itself at different times:

$$\text{item}(\text{at time } t_1) \neq \text{item}(\text{at time } t_2).$$

Toward an Expanded Logical Paradigm

I have presented here the Law of Excluded Middle by Aristotle, then the Law of Included Middle, Law of Included Multiple-Middles, and I introduced for the first time the Law of Included Infinitely-Many-Middles. Afterwards, several comments I made on Aristotle's Syllogism, Principle of NonContradiction, and Principle of Identity, that, in the many-valued logics, may have degrees of partial truth and partial falsehood even partial indeterminacy - depending on each application.

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Upside-Down Logics: Falsification of the Truth and Truthification of the False

This short paper is about funny science, recreational mathematics, upside-down thinking, or contradictory reasoning (to think backward). Since a statement in some conditions may be true, in other conditions false, and a third type of conditions partially true and partially false. The paper presents for the first time two types of Upside-Down Logic, the first one is falsification of the Truth (when a true statement is transformed into a false one), and the second one is the opposite: Truthification of the False (when a false statement is transformed into a true one) - within the frame of Recreational Neutrosophy. All transformations from $[A]$ to $[\text{anti}A]$ or vice versa should be real, making sense in our real world. Kind of magic logic!¹

Neutrosophy, Contradictory Reasoning, Upside-Down Thinking, Recreational Neutrosophy, Recreational Mathematics.

Falsification and Truthification are mostly used in the Social Sciences (Anthropology, Archaeology, Economics, Geography, History, Law, Linguistics, Politics, Psychology, Sociology), Philosophy, etc. — excelling in Politics:

Falsifying the Truth of Enemies [We seek to diminish the enemy's positive side to the point of cancellation and to increase the enemy's negative side to the point of exaggeration;] and *Truthifying the False of the Friends* [The opposite: We seek to decrease the friend's negative side to the point of cancellation, and to increase the friend's positive side to the point of exaggeration.].

¹ A version of this paper, published in: Smarandache, Florentin (2024). "Upside-Down Logics: Falsification of the Truth and Truthification of the False." *Systems Assessment and Engineering Management* 1:1-7., <https://doi.org/10.61356/j.saem.2024.1248>.

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Truth and False in a Neutrosophic Paradigm

Once again: Neutrosophy's emphasis on neutrality, paradoxes, and indeterminacy makes it relevant for exploring real-world scenarios where truth is complex and multifaceted.

Neutrosophy is based on the dynamics between the opposites $[A]$, $[antiA]$, and their neutralities $[neutA]$, where $[A]$ is an item (concept, attribute, idea, theory, etc.) and $[antiA]$ its opposite, while $[neutA]$ is the neutrals or indeterminacies between them.

For example: $[A]$ = truth, $[antiA]$ = false, and $[neutA]$ = neutral, or indeterminacy between truth and false (for example 70% truth and 30% false). The neutral part $[neutA]$ may be, for example, partially $[A]$, and partially $[antiA]$. Some neutrality may have a higher degree of truth than falsehood, others a higher degree of falsehood than truth. In the worst scenario, as indeterminacy in between the opposite one may have a partial degree of $[A]$, partial degree of $[neutA]$, and partial degree of $[antiA]$.

Processes and Conversions in Upside-Down Logic

Truthification (*Truth-ification*) means: to make something true; I introduce this word. Both, Falsification of the Truth & Truthification of the False, are carried out through the same strategies:

- By changing the space or the time of the problem;
- By changing the attributes of the elements in the space;
- By changing the logic (procedure, tactic, method) of approaching the problem;
- By interpreting the opposite meaning;
- Reversed logic;
- By transforming the linguist expressions from the figurative sense to the proper sense, or vice-versa;
- By finding the sense of the non-sense, or the non-sense of the sense;
- Word games, puzzles;
- Riddles;
- Jokes;
- Etc.

Of course, these methods and practical strategies should be real, they should make sense in our everyday life.

Changing the Space or Time of a Problem

This involves shifting the context or perspective to gain new insights. Let us exercise an example of changing the timeframe: Problems can often seem daunting because of time constraints. By imagining the problem in a different timeframe, you can explore new approaches. For example, if you're working on a project with a tight deadline, imagine how you'd tackle it with more time. This exercise can reveal shortcuts or techniques that can be applied even within a limited timeframe.

Changing the space or time of the problem involves manipulating the context or setting of an issue to create a different narrative. By altering where or when an event is said to have occurred, one can shift its perceived truth.

Changing Attributes of Elements in a Space

This technique involves altering certain characteristics to create a different outcome. For example, if you're solving a puzzle involving color-coded items, changing the color scheme could lead to a new solution.

Changing the attributes or characteristics of the problem involves modifying certain elements or traits of an issue to make it seem more plausible or to cast doubt on its accuracy. For example, changing key details about a person or event can make a fabricated story seem more credible, or make a true story appear dubious.

Interpreting in Reverse

This method involves taking a concept and flipping it, often leading to humorous or unexpected outcomes.

- (i) An example could be the classic double-sense of a word, "What has keys but can't open locks?"

The *answer* is a piano, interpreting the word "keys" in a non-traditional way.

Changing the Logic (Procedure, Tactic, Method) of Approaching the Problem. This strategy focuses on altering the reasoning or method used to analyze an issue. By introducing different logic or misusing data, one can create confusion or lead to false conclusions.

- (ii) Another logic: How can we have ten divided by two equals to zero?

Answer: Ten cookies divided by two kids are eaten and nothing has remained!

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Literal and Figurative Interpretations

This technique involves taking figurative language literally or vice versa. A joke that uses this is, “I told my friend to break a leg, and he actually fell!” Here, the phrase “break a leg,” which usually means “good luck,” is taken literally.

Riddles

Riddles often rely on misleading information or double meanings to challenge the solver.

- (i) A classic example is, “What has to be broken before you can use it?”

The *answer* is “an egg,” where the word “broken” is used in a different context.

- (ii) Spell out the number NINE.

Solution:

| | | | | | | | | |

(In this case “spell” means to list all little (vertical, oblique, and horizontal) bars that compose the word NINE, or eleven bars!)

- (iii) I am invisible but can be measured. I affect everyone and everything that is anything. I span the universe and change from place to place. What am I?

Solution: I am “gravity”.

Jokes

Jokes use a variety of techniques to create humor, including wordplay, puns, or unexpected twists.

- (i) An example of a pun-based joke is, “Why don’t scientists trust atoms? Because they make up everything!”

This plays on the double meaning of “make up.”

- (ii) How would a mathematician measure the intensity of an earthquake on a meteor as in the movie Armageddon?

Solution: It is impossible to have an earthquake on a meteor!

- (iii) 15 Hunters Went Bear Hunting. One Killed 2 Bears. How Many Bears Have One Killed?

Solution: Two. (“One” is the name of one of the hunters.)

- (iv) $w2 = u$. Find a logic for this equality.

Solution: The letter “w” is double “u”, or “uu”, then dividing “uu” by 2 one gets one “u”.

Funny Problems²

(i) Calculate the volume of a square (!)

Solution:

Volume = Area of the Base×Height = Side² × 0 = 0!

We look at the square as an extreme case of a parallelepiped whose height is null.

(ii) ? × 7 = 2 (?)

Solution:

Of course, $\frac{2}{7} \times 7 = 2$ (!)

(iii) If you have a couple of threes and divide them in half, why do you end up with 4 pieces?

Solution: ♀♀

The Lucky Mathematics³

If, by apparently a wrong calculation (method, algorithm, operation, etc.) one arrives at the right answer, that is called a Lucky Calculation (Method, Algorithm, Operation, etc.)!

The apparently wrong calculation (method, algorithm, operation, etc.) should be funny (somehow similar to a correct one, producing confusion and a smile)!

(i) What is a hungry man's multiplication factor?

Solution: 8×8, because "eight times eight" is pronounced the same as "ate time ate"!

(ii) How can you add 3 with 3 and get 8?

Solution: $\epsilon\exists = 8$

{Let's laugh: ha, ha, ha!}

² More funny problems in: Smarandache, Florentin (2000). "Funny Problems," pp. 37-142, in the book of *Collected Papers*, third volume, Oradea, Romania: Abaddaba. Available online: <https://fs.unm.edu/CP3.pdf>.

³ More like this in Smarandache, Florentin (2007). "Amusing Problems," from p. 213, in the book *Collected Papers*, first volume, second edition, translated from Romanian and French into English by the author. Ann Arbor, MI, USA: ProQuest Information and Learning. Available online: <https://fs.unm.edu/CP1.pdf>.

Falsification and Truthification in Soft Sciences

They are mostly used in the Social Sciences (Anthropology, Archaeology, Economics, Geography, History, Law, Linguistics, Politics, Psychology, Sociology), but also in Philosophy, etc.

Excelling in Politics:

- Falsifying the Truth of Enemies; and
- Truthifying the False of the Friends.

Real Examples frequently broadcasted on the TV

i) Let's assume a project of law is proposed to Congress to be approved. People who oppose it are labeled as enemies by the leaders, while those who support it are labeled as friends.

Let's assume that there is a demonstration of several thousand people in the city center against this project of law.

Falsification of the Truth:

The TV station broadcast: A few dozen people demonstrate in the city center against this project of law.

ii) Let's assume that there is a counterdemonstration of a few people in the city center in support of this project of law.

Truthification of the False:

The TV station broadcast: Thousands of people demonstrate in the city center in support of this project of law.

Upside-Down Logic in Physics

Relativity of Time

The idea that time is absolute was widely accepted before Einstein's theory of relativity. However, relativity demonstrated that time is relative, depending on the observer's velocity. This represents the truthification of what was once considered false.

Schrödinger's Cat Paradox

In quantum mechanics, a cat placed in a box with a poison-releasing mechanism triggered by a quantum event is simultaneously alive and dead until observed. This is a real-world application of neutrality between truth and falsehood.

Upside-Down Logic in Philosophy

Paradox of the Liar

The statement: “*This sentence is false.*” If the sentence is true, then it must be false. If it is false, then it must be true. This contradiction creates an endless logical loop, demonstrating the ambiguity between truth and falsehood.

Zeno’s Paradoxes

Achilles can never catch up with a tortoise if the tortoise has a head start, according to the paradox. Despite this logical conclusion, reality proves the opposite, illustrating how an initially convincing logical statement can be falsified.

Upside-Down Logic in Social Sciences

Historical Revisionism

Many historical events have been reinterpreted over time. For example, figures once considered villains in history might later be seen as heroes due to a change in perspective and context.

Psychological Perception of Reality

The placebo effect illustrates that belief can shape reality. A sugar pill with no active ingredient can still cure symptoms if the patient believes in its effectiveness—truthification of the false.

Real Examples of Falsification of the Truth

1. $1 = 1$ (True)

Falsification of the above:

$1 \text{ meter} = 1 \text{ kilometer}$

{*False*, by introducing the elements' attributes (measurement units)}

2. $2 + 3 = 5$ (True)

Falsification of the above:

$2 + 3 = 5$ in base 10, but changing the base to 5 one gets:

$2 + 3 = 10$ in base 5, or $.2_5 + 3_5 = 10_5$.

3. Ten birds are flying up in the sky. A hunter shoots three of them. How many birds remain?

Answer:

$10 - 3 = 7$ birds, those who are still flying [the space is the sky].

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Three falsifications of the above [by changing the space of the elements (birds)].

3.1 Ten birds are on a fence. A hunter shoots three of them. How many birds remain?

Answer: The space is the fence.

None, because the three dead birds fell off the fence and the other seven flew away!

3.2 Ten birds are in a meadow. A hunter shoots three of them. How many birds remain?

Answer: The space is the meadow.

Three birds, the dead birds remaining on the meadow, because the other seven flew away!

3.3 Ten birds are in a cage. A hunter shoots three of them. How many birds remain?

Answer: The space is the cage.

Ten birds, dead and alive, because none could get out of the cage!

Real Examples of Truthification of the False

1) $2 = 1$ (False)

Solution (Truthification of the above):

2 pints = 1 quart {True, by introducing the elements' attributes (measurement units)}

2) A man weights the following weights on the following dates.

6/1/70	150 lbs.
6/3/70	0 lbs.
6/5/70	25 lbs.
6/7/70	0 lbs.
6/9/70	145 lbs.

How is it possible?

Solution (Truthification):

Man is an astronaut who went to the Moon and back.

Outer-space weightlessness: 0 lbs.

16 of his Earth Gravity (150 lbs), or Gravity of Moon: 25 lbs.

3) From two false hypotheses get a true statement.

Grass is edible. *False*

Edible things are green. *False*

Therefore, grass is green. *True*

4) "When a cup of milk is added to a cup of popcorn then only one cup of mixture will result because the cup of popcorn will very nearly absorb a whole cup of milk without spillage.

So, in the last case, we have $1 + 1 = 1$.

It is impossible in the conventional arithmetic but it is true for some non-Diophantine arithmetic."⁴

5) Prove that the equation $x=x+2$ has two distinct solutions.

Answer: This is an inconsistent equation in the set of finite real numbers, but in the set of infinities it is not: the solutions are $x=\pm\infty$.

Toward Acknowledging the Shaping of Truth and Falsehood through Creative Strategies

I presented two types of Upside-Down Logic, the first one: Falsification of the Truth (*when a true statement is transformed into a false one*), while the second one is the opposite: Truthification of the False (*when a false statement is transformed into a true one*) — within the frame of Recreational Neutrosophy. All transformations from $[A]$ to $[\text{anti}A]$ or vice versa should be real, making sense in our real world.

⁴ Mark Burgin, "Diophantine and Non-Diophantine Arithmetics: Operations with Numbers in Science and Everyday Life," in *arXiv*. Accessed on 24 April 2024.

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The Evolution and Limits of Philosophy. A Neutrosophic Perspective

Philosophy has long been a field that thrives on paradoxes, contradictions, and the perpetual reinvention of ideas. Let us shortly explore the limits of philosophical thought through the lens of neutrosophy, by challenging traditional dichotomies such as tautology vs. nihilism and thesis vs. antithesis. That is what neutrosophy seeks to do: *introduce a pluralistic and process-oriented approach to philosophical inquiry.*

Neutrosophy, Paradox, Affirmation, Negation, Neutrality, Tautologism, Nihilism, Dialectics, Marxism, Materialism, Intellectual cycles, Contradiction, Dynaphilosophy.

Philosophy has a dual nature: it is both *tautological* and *nihilistic*. Initially, any philosophical idea, when introduced, appears self-evident within its context. It is true by virtue of its form, supported by its originator and their arguments. This tautological nature renders philosophy seemingly empty—reiterating what is already implicit and relying on a priori knowledge. However, *this initial truth is not static*. Over time, ideas that were once considered true are scrutinized. Philosophy, in this sense, becomes nihilistic—overloaded with contradictions and relying on a posteriori knowledge. The very nature of philosophical progress ensures that no idea remains uncontested, making the discipline both logically necessary and logically impossible.

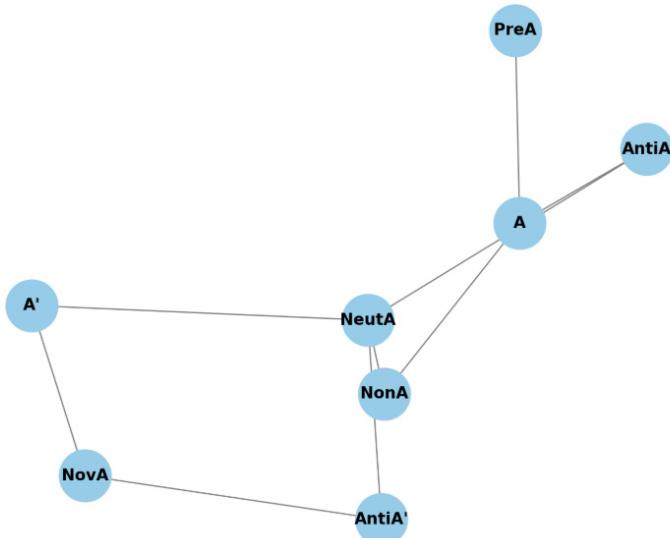
From Cycles to Knots: The Evolution of Ideas

Traditional frameworks like cyclical spiral of ideas suggest a predictable, recurring evolution of thought. However, neutrosophy posits that the trajectory of ideas is neither cyclic nor linear but discontinuous, knotted, and boundless. The evolution of an idea [A] involves an intricate interplay of various stages:

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- **[PreA]** The precursors to the idea, existing as fragments or inklings within the ideational background.
- **[A]** The idea itself, emerging in a defined form and gaining prominence.
- **[NonA]** Concepts and states outside the idea but not necessarily opposing it.
- **[AntiA]** The direct opposition to the idea, often formed as a critique or rejection.
- **[NeutA]** Neutral ideas that neither affirm nor negate , forming a spectrum of intermediate states.
- **[A']** and **[AntiA']**: Versions and reinterpretations of the idea and its opposition, shaped by cultural, historical, and contextual factors.
- **[NovA]** The idea reimagined in new contexts, incorporating elements of and , resulting in a broader, more heterogeneous framework.



Graph 3. Evolution of Ideas – a neutrosophic perspective

The graph shows nodes for **PreA**, **A**, **NonA**, **AntiA**, **NeutA**, **A'**, **AntiA'**, and **NovA**, with directed edges connecting them in a manner that reflects the evolution of ideas.

This progression reflects the dynamic nature of ideas, which are never static but constantly mixing, melting, and transforming. As evolves, it paradoxically incorporates its opposites and neutralities, ultimately dissolving into the larger ideational background, only to reemerge in new forms.

Hegel, Marx, and Beyond: From Dialectics to Pluralism

The classical dialectical frameworks of Hegel and Marx are insufficient to capture the complexity of ideational evolution. Hegel's triadic scheme—thesis, antithesis, and synthesis—and Marx's materialist adaptation (assertion, negation, and negation of negation) oversimplify the dynamic interplay of ideas.

Neutrosophy generalizes this framework into a pluradic, pyramidal scheme.

The development of an idea is not a straightforward opposition between thesis $[A]$ and antithesis $[AntiA]$. Instead, it involves the continuous interplay of:

- *Neutralities* $[NeutA]$: Preexisting and intermediate ideas that influence both $[A]$ and $[AntiA]$.
- *Versions and Deviations* ($[A']$, $[AntiA']$): Iterations and reinterpretations of both the thesis and antithesis.
- *Synthesis and Beyond* $[NovA]$: New configurations of the idea that integrate elements of its predecessors and neutralities.

For example, consider the philosophical debate between idealism and materialism. Traditional dialectics would posit materialism as the negation of idealism, with synthesis as a higher resolution. Neutrosophy, however, explores the neutralities—such as pragmatism or dual-aspect monism—that arise between these poles, as well as the nuanced versions and reinterpretations that emerge in diverse cultural and intellectual contexts.

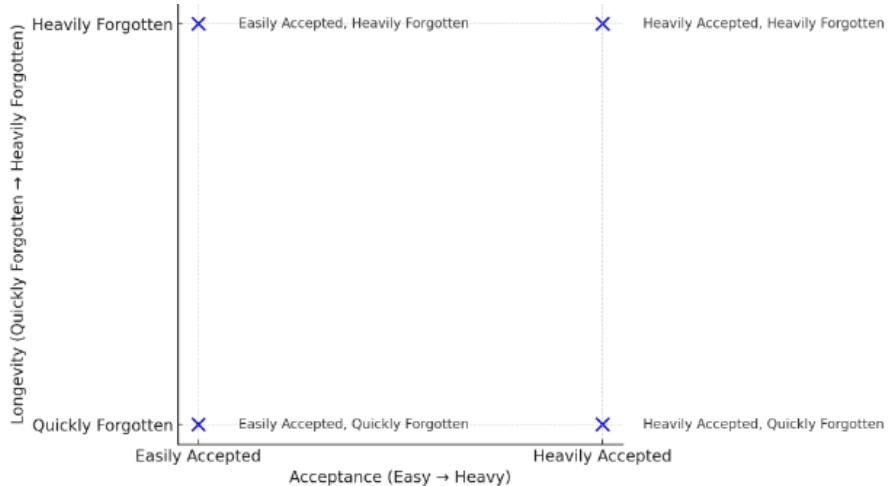
Classification and Evolution of Ideas

Neutrosophy offers a detailed classification of ideas based on their acceptance and longevity:

- **Easily Accepted, Quickly Forgotten**: Ideas that align with prevailing paradigms but lack enduring impact.
- **Easily Accepted, Heavily Forgotten**: Ideas that are initially embraced but later discarded due to oversaturation or irrelevance.
- **Heavily Accepted, Quickly Forgotten**: Revolutionary ideas that face initial resistance but are rapidly assimilated and subsequently overlooked.
- **Heavily Accepted, Heavily Forgotten**: Transformative ideas that endure rigorous scrutiny and remain influential for extended periods before fading.

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Graph 4. Classification and Evolution of Ideas

The x -axis represents Acceptance (Easy \rightarrow Heavy), and the y -axis represents Longevity (Quickly Forgotten \rightarrow Heavily Forgotten).

The graph represent the classification and evolution of ideas based on their acceptance and longevity.

These categories illustrate the complex dynamics of ideational life. An idea's trajectory is not determined solely by its content but by its interactions with the broader intellectual and cultural landscape.

Toward a Dynamic Philosophy

Neutrosophy redefines philosophy as a dynamic, boundless process. It moves beyond static categories and simplistic oppositions. Philosophy, in this view, is not merely a pursuit of timeless truths or definitive resolutions. It is a living, evolving practice—a “dynaphilosophy” that recognizes the infinite road of ideas, with all its knots, discontinuities, and paradoxes. As new ideas emerge, they affirm certain truths while denying others, only to face eventual negation themselves. This process underscores the idea that “all is true, even the false” and “all is false, even the truth.” This paradoxical foundation allows neutrosophy to address the limits of philosophy.

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Logical Pluralism and Neutrosophy. Reflections on the Nature of Truth

When students first encounter logic, their journey often begins with classical logic, a foundational framework widely applied in fields such as mathematics, computer science, and philosophy. The classical logic is a rigid structure with binary distinctions between true and false, frequently regarded as the default system of reasoning. However, deeper exploration into symbolic logic reveals a more complex landscape, where no single, universally accepted system prevails. Instead, an array of logical frameworks emerges, each offering multifaceted perspectives on truth, validity, or inference.

Logical pluralism, Neutrosophic Logic, Truth, Validity, Non-classical logics, Philosophy of Logic, Classical Logic, Intuitionistic Logic, Paraconsistent Logic, Dialetheism, Fuzzy Logic, Indeterminacy, Vagueness, Contradictions, Triadic reasoning, Beyond binary reasoning, Neutralities in logical systems, Liar Paradox, Decision-making under uncertainty, Multi-valued logics.

The theory of logical pluralism suggests that there is no single one true logic. As Susan Haack argues in *Philosophy of Logics*, validity is not a singular, unambiguous concept; it is inherently vague [Haack] Different logical systems, by making this vague idea precise in different ways, provide distinct but equally legitimate ways of understanding reasoning. This view has been expanded by philosophers like J. C. Beall and Greg Restall in their *Logical Pluralism* [Beall&Restall]. They argue that multiple systems of logic can each offer a valid account of reasoning, according to the Generalized Tarski Schema of logical validity.¹ This pluralistic perspective resonates closely with the ideas behind neutrosophy—which, again, is a framework that goes beyond classical boundaries and encompassing ambiguity and contradiction.

¹ Hodges, Wilfrid, “Tarski’s Truth Definitions”, *The Stanford Encyclopedia of Philosophy* (Winter 2022 Edition), Edward N. Zalta & Uri Nodelman (eds.). <https://plato.stanford.edu/archives/win2022/entries/tarski-truth>. Accesed: 20 June 2024.

Multiple Paths to Understanding Validity

At the heart of logical pluralism lies the idea that different logical systems offer different methods for determining the truth or validity of statements. Each system might be better suited to certain types of problems or contexts, suggesting that no one (single) system can fully capture the complexity of reasoning. In the work of Beall and Restall, the concept of validity is decoupled from any single logical system. By extending the Tarski Schema, which states that a logical system is valid if its conclusions are true whenever its premises are true, they allow for different interpretations of truth and validity, depending on the system in question. This idea echoes Haack's view that the concept of validity is inherently vague, and different systems offer different precisions of this vagueness. For instance, intuitionistic logic, paraconsistent logic, and dialetheic logic each provide different ways to deal with the limits of classical reasoning. Are these systems in competition, each vying for the title of the ultimate logic, or are they better understood as tools that serve distinct purposes depending on the problem at hand?

Object Language and Metalanguage

When defining truth for a language L (the *object language*), the definition must be framed in another language M (the *metalanguage*). M must:

- Include a copy of L , allowing anything expressible in L to also be stated in M .
- Be capable of discussing L 's sentences and syntax.
- Incorporate set-theoretic concepts and a unary predicate, $\{\text{True}\}$, which denotes “is a true sentence of L .”

The purpose of the metalanguage is to formalize statements about L , supported by axioms in M that justify the truth definition. Tarski stipulated that $\{\text{True}\}$ should be defined using syntax, set theory, and L 's notions, avoiding semantic terms like “denote” or “mean” unless they are part of L .

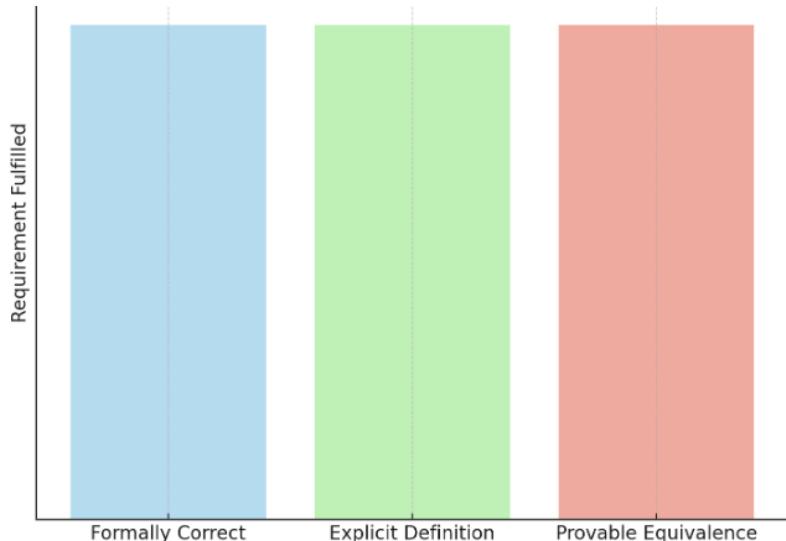
Formal Correctness

The truth definition for L must be *formally correct*, i.e. $\{\text{True}\}$ is:

$$\forall x, \text{True}(x) \Leftrightarrow \phi(x),$$

where $\{\text{True}\}$ does not appear in ϕ . Alternatively, the definition must be provably equivalent to such a statement using axioms of M that exclude $\{\text{True}\}$. Definitions of this form are called *explicit*, or “normal” in Tarski’s terminology. [Tarski 1933]

Let us emphasize in a chart the necessary conditions for formal correctness in Tarski's framework:



Graph 5. Requirements for a formally correct truth definition

Each category represents a key condition:

1. Formally Correct: {True} True must be defined as $\forall x, \text{True}(x) \Leftrightarrow \phi(x)$.
2. Explicit Definition: ϕ must exclude {True}.
3. Provable Equivalence: The definition must be provably equivalent to the explicit form using axioms of M that do not include {True}.

Material Adequacy

The truth definition must also be *materially adequate* (or “accurate”), meaning ϕ should precisely capture the sentences intuitively considered true in L . This must be provable using M 's axioms.

At first glance, this seems paradoxical: proving material adequacy appears to assume an already adequate definition of truth, risking infinite regress. Tarski avoided this by requiring M to formalize infinitely many equivalences of the form:

$$\phi(s) \Leftrightarrow \psi,$$

where s is the name of an L -sentence S , and ψ is S 's counterpart in M . The challenge lies in identifying a single formula ϕ to derive all such equivalences from M 's axioms, thus defining {True}.

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Tarski formalized this requirement as *Convention T*, a cornerstone of his semantic conception of truth. However, when L can discuss its own semantics, Convention *T* leads to the liar paradox. Tarski concluded that M must be stronger than L .

Implications for Mathematics

In mathematics, first-order *Zermelo-Fraenkel set theory* (ZF) is considered the standard for correctness. However, Tarski's results imply that a truth definition for ZF cannot be given within ZF itself. The usual workaround is to define truth informally in a natural language like English.

Limited formal truth definitions for ZF exist. For instance, Azriel Levy showed that for any natural number n , a Σ_n formula identifies precisely the true Σ_n sentences of set theory. Key properties of Σ_n formulas include:

- Any set-theoretic sentence is equivalent to a Σ_n sentence for sufficiently large n .
- Σ_n formulas are closed under existential quantifiers but not universal quantifiers.
- Σ_n formulas are not closed under negation, which avoids Tarski's paradox.

Similar techniques underpin Jaakko Hintikka's internal truth definitions for independence-friendly logic, which shares these characteristics with Σ_n classes [Hintikka].

Dialetheism and the Case for Logical Pluralism

One of the most radical challenges to classical logic comes from dialetheism, a position championed by Graham Priest. Dialetheism asserts that some propositions can be both true and false at the same time, directly violating the classical law of non-contradiction. Priest's works [Priest 1987; 2002] explore the possibility that contradictions are not just logical anomalies to be dismissed but could be coherent and meaningful in certain contexts.

Let us go into further detail. A *dialetheia* is a sentence A for which both A and its negation $\neg A$ are true simultaneously. If we accept that falsity is the truth of negation, a *dialetheia* represents a situation where a sentence is both true and false at the same time. This paradoxical scenario results in what is known as a *truth-value glut*, where a sentence possesses two conflicting truth values. This stands in contrast to a *truth-value gap*, where a sentence is neither

true nor false.² This definition of a dialetheia can easily be extended to other truth-bearers such as propositions or statements. The choice of truth-bearer is not crucial, as the key concept remains the same: a sentence or equivalent entity that embodies a simultaneous truth and falsity.

For example, the liar paradox,³ in which a statement refers to itself as false, may be resolved by accepting that the statement is both true and false simultaneously. This paradoxical situation challenges the very foundation of classical logic, suggesting that reasoning may sometimes need to accommodate contradictions rather than reject them outright.⁴

Logic proves ineffective in addressing paradoxes, as resolving inconsistencies necessitates choosing between alternatives to abandon certain premises.⁵ According to Rescher, logic itself is value-neutral, and managing paradoxes demands resources that extend beyond the scope of logic. [Rescher] Consequently, the challenge lies in identifying appropriate and practical concepts capable of realizing his intuitions.

Dialetheic logic is a system designed specifically to handle such contradictions, allowing for the simultaneous truth and falsity of propositions. As such, it embodies a logical pluralist approach, where the classical logic of true/false oppositions is inadequate.

Neutrosophic Logic: Beyond True and False

Building on fuzzy logic and intuitionistic logic, neutrosophic logic introduces a third value—indeterminacy—in addition to truth and falsity. In neutrosophic logic, every proposition is assigned a degree of truth (T), a degree of falsity (F), and a degree of indeterminacy (I), each of which can range from 0 to 1.

² Priest, Graham, Francesco Berto, and Zach Weber, “Dialetheism”, *The Stanford Encyclopedia of Philosophy* (Summer 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/sum2024/entries/dialetheism/>. Accesed: 3 July 2024.

³ Beall, Jc, Michael Glanzberg, and David Ripley, “Liar Paradox”, *The Stanford Encyclopedia of Philosophy* (Winter 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/win2023/entries/liar-paradox/>. Accesed: 2 June 2024.

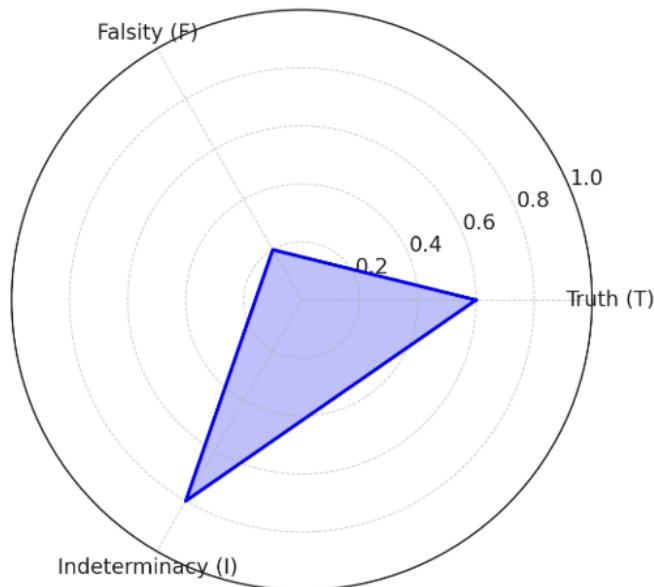
⁴ Smith, J. M. (1991). [Review of *In Contradiction, A Study of the Transconsistent.*, by G. Priest]. *Noûs*, 25(3), 380–383. <https://doi.org/10.2307/2215513>. Accesed: 29 June 2024.

⁵ Cantini, A. (2004). [Review of *Paradoxes: Their Roots, Range, and Resolution*, by N. Rescher]. *Studia Logica: An International Journal for Symbolic Logic*, 76(1), 135–142. <http://www.jstor.org/stable/20016577>. Accesed: 28 June 2024.

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This triadic approach proved to be particularly useful in contexts where information is incomplete, contradictory, or vague, such as in decision-making under uncertainty or quantum mechanics. [Smarandache]



Graph 6. Degrees of Truth (T), Falsity (F), and Indeterminacy (I)
This is a radar chart visualizing the degrees of truth (T), falsity (F), and indeterminacy (I) in neutrosophic logic.

The values ($T = 0.6$, $F = 0.2$, $I = 0.8$) are illustrative and represent how neutrosophic logic embraces a spectrum of possibilities.

The introduction of indeterminacy allows neutrosophic logic to embrace the *neutralities* that are essential to the concept of neutrosophy itself. Like logical pluralism, neutrosophic logic does not insist on a single, absolute truth but instead recognizes that truth is often a matter of degree and context.

Neutrosophic logic, by accommodating indeterminacy, also aligns with the views of Haack and Beall and Restall, who argue that logical systems should not be seen as competing for dominance but as addressing different aspects of reasoning.

In neutrosophic logic, indeterminacy is not a flaw or a problem to be resolved but a fundamental aspect of reasoning, especially in contexts where uncertainty is an inherent feature of the system being modeled.

The Philosophical Implications: Tools or Rivals?

The debate over whether different logical systems are rivals or tools for different contexts touches on deeper philosophical questions about the nature of truth and validity. For *logical pluralists* like Beall and Restall, the diversity of logical systems reflects the inherent complexity of reasoning. There is no one-size-fits-all solution to the problems of truth and inference; rather, different systems offer different ways to navigate the vagueness and contradictions present in the world.

This pluralistic view challenges the idea of a **One True Logic**, suggesting instead that logic is a flexible, context-sensitive tool. Just as different tools are suited for different tasks, different logical systems are suited to different types of reasoning. *Dialetheic logic* excels at resolving paradoxes, *intuitionistic logic* offers insights into the nature of constructive proof, and *neutrosophic logic* is particularly effective in contexts of indeterminacy and uncertainty.

Toward a Pluralistic Understanding of Logic and Truth

The exploration of logical pluralism, dialetheism, and neutrosophic logic reveals a deep philosophical shift in how we understand the nature of truth and logic. Rather than seeking a single, ultimate logic, we are encouraged to recognize the diversity of logical systems as reflecting the multifaceted nature of reality. Whether dealing with contradictions, uncertainties, or vague concepts, these systems offer complementary tools for navigating the complexities of reasoning. Just as neutrosophy embraces contradiction and indeterminacy, so too does logical pluralism encourage us to expand our understanding of logic beyond the confines of classical thinking. Through this lens, the search for a single “one true logic” becomes less important than the recognition of the diverse tools available to us in the pursuit of knowledge.

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Neutrosophics of Precise Imprecision

The world, as we experience it, is suffused with indeterminacy. From the behavior of subatomic particles to the complexities of human thought and social systems, ambiguity and uncertainty are not exceptions but intrinsic properties of reality. Classical frameworks—whether grounded in strict probabilities, binary logic, or clear set membership—often falter in their ability to grapple with this pervasive indeterminacy. That is why *neutrosophy* seeks to lay the groundwork for a paradigm shift across disciplines.

Neutrosophy, Indeterminacy, Precise imprecision, Interdisciplinary philosophy, Complex systems modeling, Neutrosophic logic, Neutrosophic set, Neutrosophic probability, Dialectical thinking, Triadic reasoning, Quantum Mechanics, Heisenberg Uncertainty Principle, Superposition, Quantum entanglement, Probabilistic systems, Artificial Intelligence, Machine learning, Neural networks, Natural language processing, Handling ambiguity in AI, Ambiguity, Decision-making, uncertainty, Neutrosophic analysis in sociology and economics, Literary ambiguity, Continuum of truth-values, Probabilistic reasoning, Indeterminacy in dialectical traditions.

Classical probability, set theory, and logic operate under assumptions of *definiteness*. For example, in probability theory, an event either occurs or it does not, with a single probability value assigned. In classical logic, a proposition is *true* or *false*. While these frameworks have provided robust tools for centuries, they stumble in contexts where uncertainty, paradox, or ambiguity dominate.

Quantum mechanics is a poignant example. The Heisenberg Uncertainty Principle highlights the inherent limitations in measuring a particle's position and momentum simultaneously. Similarly, in human cognition and social dynamics, ambiguity often arises not as a failure of understanding but as a natural state.

Traditional frameworks reduce this complexity to oversimplified binaries, losing essential nuances.

The Need for Neutrosophic Extensions

To address these limitations, we require what might be termed a *precise imprecision*. Neutrosophy offers a foundational perspective for such precision. At its core, neutrosophy generalizes classical notions by introducing the concept of truth, falsity, and indeterminacy as coexisting components. Unlike fuzzy logic, which focuses on degrees of truth, neutrosophic logic explicitly incorporates doubt and indeterminacy as intrinsic elements of reasoning.

In this framework:

- **Neutrosophic probability** extends classical probability by accounting for the degree of indeterminacy in an event's occurrence.
- **Neutrosophic sets** allow elements to have varying degrees of membership, non-membership, and neutral membership, acknowledging partial and ambiguous associations.
- **Neutrosophic logic** integrates truth, falsity, and indeterminacy, making it possible to model complex, uncertain systems more faithfully.

Applications in Science and Beyond

Quantum Mechanics

The probabilistic nature of quantum mechanics aligns naturally with neutrosophic ideas. In the subatomic realm, particles often defy classical concepts of exact location and momentum. Instead of seeking definitive probabilities, we calculate *neutrosophic probabilities*, which incorporate percentages of indeterminacy. This approach not only reflects the intrinsic uncertainties of quantum systems but also opens new pathways for understanding phenomena like superposition and entanglement.

Artificial Intelligence and Neural Networks

In AI, uncertainty and ambiguity are prevalent, whether in natural language processing, image recognition, or decision-making systems. Neutrosophic logic provides a richer framework for designing algorithms capable of handling contradictory or incomplete information, enabling more adaptive and human-like reasoning.

Psychology, Sociology, and Economics

Human behavior and societal dynamics are often characterized by conflicting motivations and ambiguous outcomes. Neutrosophic philosophy provides tools to model these complexities, bridging quantitative and qualitative analyses. For instance, in economics, decisions are rarely based purely on rational probabilities; incorporating neutrosophic principles could refine models of market behavior.

Literature and the Arts

Ambiguity and paradox are central to artistic and literary expression. Neutrosophic ideas can deepen our understanding of texts and artworks by providing a framework for interpreting the interplay of truth, falsity, and indeterminacy in creative works.

The Interdisciplinary Nature of Neutrosophic Philosophy

The significance of neutrosophy lies not only in its technical applications but also in its philosophical implications. By emphasizing the interplay of positive, negative, and neutral elements, neutrosophy resonates with dialectical traditions in philosophy. It invites a reevaluation of historical schools of thought, encouraging researchers to extract their positive, negative, and neutral contributions.

Moreover, the interrelationship between mathematics and the humanities underscores the unifying potential of neutrosophic philosophy. Mathematics, often seen as a domain of rigid precision, becomes a language for exploring psychological, sociological, and literary complexities. Neutrosophy thus serves as a bridge between seemingly disparate disciplines, fostering a holistic understanding of reality.

Toward a Paradigm of Indeterminacy

The foundation of neutrosophic philosophy is an invitation to collective inquiry. By embracing indeterminacy and striving for a precise imprecision, neutrosophic philosophy offers a transformative lens through which to view the complexities of the world. It is a philosophy not of closure but of openness, a framework not of final answers but of endless exploration.

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Beyond Dialectics, Paradoxes, and Binary Logic

Philosophy, long defined by its pursuit of truth, has historically been a battleground for dichotomies: truth vs. falsehood, materialism vs. idealism, reason vs. emotion. These oppositions often provide a framework for understanding philosophical discourse, but they fail to capture the full nuances of reality. To challenge these binary oppositions, I introduced the neutrosophic perspective in philosophy, rooted in Mathematics, and Many-Valued Logics.¹ By emphasizing the interrelation of affirmation, negation, and neutrality, neutrosophy allows for the reconciliation of seemingly irreconcilable viewpoints, providing a new lens through which to reinterpret age-old philosophical questions.

Neutrosophy, Neutrosophic Transdisciplinarity, Dialectics, Trialectics, Transalectics, Paradoxes, Multiplicity of Truth, Universalism, Particularism, Hermeneutics, Mind-Body, Philosophy of Philosophy, Unified Field Theory, Knowledge Integration.

Wittgenstein's *Tractatus*² famously contended that language shapes our understanding of reality, proposing that the structure of language reflects the structure of the world [Wittgenstein]. Yet even Wittgenstein struggled with the paradoxes inherent in communication, particularly as language often fails to capture the fluidity of meaning. Neutrosophy extends this inquiry by asserting that truth is not an absolute but a multiplicity. A statement, its negation, and the spectrum of intermediary propositions may simultaneously hold truth, partial truth, or falsity.

¹ Gottwald, Siegfried, "Many-Valued Logic", *The Stanford Encyclopedia of Philosophy* (Summer 2022 Edition), Edward N. Zalta (ed.), <https://plato.stanford.edu/archives/sum2022/entries/logic-manyvalued>. Accesed: 29 May 2024.

² Wittgenstein's work on the limitations of language and its impact on understanding the world is foundational in discussions about meaning and truth in philosophy. Neutrosophy builds on this by expanding the idea of partial truth.

Many-Valued Logics

Many-valued logics emerged as a response to philosophical issues of the “law of the excluded middle,” a fundamental principle in classical logic that asserts every proposition must be either true or false, with no middle ground.

To address these concerns, the first formal systems of many-valued logic were pioneered in the 1920s by Jan Łukasiewicz in Poland and Emil Post in the United States. Their groundbreaking work laid the foundation for a rapidly expanding field, as researchers recognized the broader applicability of many-valued systems to various philosophical, mathematical, and semantic challenges. [Bolc, Borowik]

One significant development in this domain was intuitionistic logic, which arose from fundamental questions about the nature of mathematical truth and constructivist approaches to proof theory. Similarly, other branches of many-valued logic—such as fuzzy logic, approximation logic, and probabilistic logic—have been developed to address issues that classical binary logic is ill-equipped to handle.

These systems enable more nuanced reasoning by allowing for degrees of truth, uncertainty, and approximation, making them particularly useful in areas like artificial intelligence, decision-making processes, and linguistic modeling.

Each of these many-valued logical frameworks has given rise to distinct formal systems, providing a rigorous mathematical structure to explore and apply these ideas effectively.

Beyond Dialectics: Trialectics and Transdialectics

For instance, in ethical philosophy, the debates between universalism and particularism exemplify this complexity. Universal principles such as justice or equality often conflict with cultural and contextual particulars, leading to tensions that neither pole resolves alone.

From a neutrosophic perspective, the resolution does not lie in choosing one over the other but in exploring the spectrum of partial overlaps, contradictions, and neutral zones that lie between them.

This approach encourages a more nuanced view of ethics, one that is neither wholly universal nor entirely particular but instead acknowledges the interplay of both as equally valid contributors to a greater understanding.

Hegel's dialectical method,³ which posits that the development of ideas occurs through the reconciliation of contradictions, has been one of the most influential contributions to philosophical thought [Hegel]. However, this framework remains incomplete, as it overlooks the potential role of neutrality in the dialectical process.

Neutrosophy extends this framework into a trialectic model, where affirmation, negation, and neutrality coexist and interact in a dynamic relationship. This model challenges the rigid opposition of traditional dialectics and invites a more inclusive understanding of how ideas evolve.

Moreover, neutrosophy introduces the concept of *transdialectics*—an understanding of ideas as part of a continuum of interactions rather than fixed oppositions. This dynamic view is especially apparent in the dialogue between science and religion. While traditional dialectics may pit science and religion as adversarial forces, neutrosophy reveals their shared quest for understanding. Both traditions seek to answer the fundamental questions of existence, but each does so through different methodologies and frameworks. The law of complementarity highlights how seemingly opposing forces can work together, not merely as rivals but as potential collaborators in the formation of a more holistic view of reality.

The Paradox of Paradoxes

Paradoxes have long been a central feature of philosophical inquiry. They present contradictions that challenge our understanding of reality, as evidenced in Zeno's paradoxes of motion.⁴ These paradoxes question the coherence of continuous progress, as each step seems to require an infinite number of divisions. Rather than seeking a definitive resolution through rejection or acceptance, neutrosophy encourages embracing the paradox as a framework for rethinking continuity itself.

In economics, this paradoxical dynamic manifests in the debate between Keynes's concept of the “unstable equilibrium”⁵ and Rugina's idea of

³ Hegel's dialectical method, which focuses on the resolution of contradictions, is critiqued and expanded by neutrosophic theory through the introduction of neutrality and trialectics.

⁴ Zeno's paradoxes of motion are key examples of the type of philosophical problems that neutrosophy seeks to engage with, showing how paradoxes can be used as tools for deeper understanding rather than obstacles.

⁵ Keynes's economic theories on equilibrium and instability are connected with neutrosophy's ideas on dynamic systems and the oscillation between stability and instability.

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a “stable disequilibrium.”⁶ Neutrosophy reconciles these opposites by positing a dynamic system that oscillates between stability and instability. Here, *equilibrium is neither a static state nor a final goal but a process of perpetual adjustment*. This is akin to the feedback loops observed in ecological or social systems, where stability arises not from stasis but from constant movement and adaptation.

The Hermeneutics of Neutrosophic Philosophy

Interpretation, or hermeneutics, has long been a cornerstone of philosophy. Gadamer,⁷ for example, emphasized the inevitability of bias in understanding, arguing that our “prejudices” shape our interpretations. Neutrosophy, however, views this bias not as a flaw but as a neutral element within the interpretative process. In this light, neutrosophy transforms the traditional understanding of horizon and prejudice into a dynamic interplay of positive, negative, and neutral perspectives.

This shift is particularly evident when analyzing historical philosophical movements. Consider the progression of ideas in Indian philosophy, exemplified by Sankaracharya’s non-duality⁸ (*Advaita*), Ramanujacharya’s special duality,⁹ and Madhvacharya’s dualism.¹⁰ What begins as a unity gradually evolves into differentiation, and through neutrosophic synthesis, a deeper unity is revealed. Neutrosophy thus fosters a view of philosophy as an evolving process of affirmation, negation, and synthesis rather than a static set of competing systems.

Neutrosophy and the Future of Philosophical Inquiry

At its core, neutrosophy itself is a philosophy of philosophy—an inquiry into its own necessity and inevitability. In this way, neutrosophy

⁶ Rugina’s exploration of stable disequilibrium in economics can be seen through the neutrosophic lens as another example of how contradictions within systems can coexist and inform each other.

⁷ Gadamer’s hermeneutics on interpretation and the influence of prejudice on understanding is enriched by neutrosophy’s view of neutrality and the dynamic interplay of perspectives.

⁸ Sankaracharya, S. (8th Century). *Advaita Vedanta*. Sankaracharya’s non-duality philosophy provides an important comparison to neutrosophic ideas about the interrelationship of opposites, where unity and differentiation evolve together.

⁹ Ramanujacharya, R. (11th Century). *Vishishtadvaita Vedanta*. Ramanujacharya’s special duality theory, offering a synthesis of unity and difference, aligns with neutrosophic approaches that combine affirmation, negation, and neutrality.

¹⁰ Madhvacharya, M. (13th Century). *Dvaita Vedanta*. Madhvacharya’s dualism serves as a historical example of philosophical thought that can be enriched by neutrosophy’s dynamic interplay of concepts.

mirrors the nature of existence itself, which is inherently paradoxical and multi-faceted. Consider the mind-body problem, traditionally framed as a dualism between physical and mental phenomena. Neutrosophy reveals that these phenomena are not opposing forces but mutually constitutive elements.

However, neutrosophy doesn't merely analyze existing philosophical problems; it offers a framework for generating new ones and exploring uncharted intellectual territory. The increasing complexity of our world, characterized by rapid technological advancements, globalization, and a growing awareness of diverse perspectives, demands philosophical tools that can grapple with ambiguity, uncertainty, and paradox.

Consider the implications of artificial intelligence. As AI systems become more sophisticated, they raise profound philosophical questions about consciousness, ethics, and the nature of humanity itself. Neutrosophy's ability to analyze the spectrum of possibilities, including the neutral or indeterminate states between human and machine intelligence, can be invaluable in exploring these uncharted territories.

Furthermore, neutrosophy's transdisciplinary nature encourages collaboration and cross-pollination of ideas between different fields of inquiry. Neutrosophy is not just a new branch of philosophy; it represents a new way of doing philosophy.

Toward a Unified Philosophical Framework

Neutrosophy's ultimate contribution lies in its potential to unify divergent schools, movements, and theories within a single, comprehensive framework. This unified field theory in philosophy is not an attempt to erase differences but to illuminate their shared underpinnings. Neutrosophy holds that no philosopher, no school of thought, is inherently superior to another; each contributes a fragment to the mosaic of human understanding. This inclusivity extends beyond the boundaries of philosophy to art, culture, and science. The marginalization of non-Western thinkers and creators highlights the importance of acknowledging diverse intellectual contributions. Neutrosophy challenges the reduction of knowledge to a narrow, Western-centric canon.

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A Neutrosophic Exploration of Creative Ideational Dynamics

Philosophy has always tried to illuminate the complexity of existence, but often faced its own paradoxes. The emergence of philosophical schools and concepts, along with their arguments, reflect the dynamic interaction of ideas. This short note explores some nuanced principles governing philosophical thought, summarized in the proposed “philosophical formulas.” These formulas are intended to mathematically and conceptually express the tensions, complementarities, and movements intrinsic in a given philosophical system.

Neutrosophy, Philosophy, Ideational Dynamics, Creative Ideation, Philosophical Formulas, Complementarity, Equilibrium, Anti-Reflexivity, Mathematization of Philosophy, Dynamic Systems.

The proliferation of numerous philosophical schools, even those that appear contradictory, is rooted in the nature of *ideational dynamics*, which comes from *creative ideation*¹ — the process of developing novel and innovative ideas as solutions to open-ended challenges [Fink et al.]. Ideas, by their very nature, do not exist in isolation. When a concept arises, it invariably generates its complement or counterpoint. This duality is characterized not merely by opposition but also by interdependence. Each idea, in its assertion, invites the emergence of an alternative or contrasting perspective that propels philosophical thought forward. The rich diversity of philosophy reflects the multitude of ways in which ideas interact, adapt, and evolve across varying contexts. Philosophy is a dynamic field shaped by continuous creative ideation, it is not a static discipline bound by fixed doctrines. This process of interaction not only broadens the scope of philosophical inquiry but also redefines its principles, adapting them to new intellectual landscapes and challenges.

¹ I borrow this term from the field of psychology.

Some Philosophical Laws

Underlying this dynamic nature of philosophy are foundational principles that govern the interaction of ideas. These principles, which can be conceptualized as laws or formulas, offer a structured understanding of how philosophical systems develop, transform, and coexist. By identifying and analyzing some of these laws, we gain deeper insights into the mechanisms that drive the evolution and diversification of philosophical thought.

Law of Equilibrium

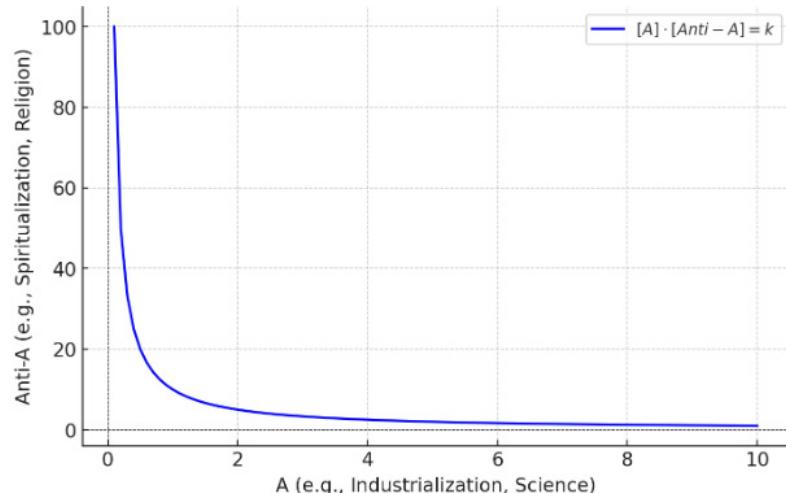
At the heart of creative ideational dynamics lies the *Law of Equilibrium*. This principle posits that as one factor increases, its opposing counterpart decreases, maintaining a balance influenced by neutralities that mediate between extremes. Mathematically, this can be expressed as:

$$[A] \times [AntiA] = k[NeutA],$$

where k is a universal constant.

In cases where A represents the centroid of neutralities, the formula simplifies to:

$$[A] \times [AntiA] = k.$$



Graph 7. The law of equilibrium

The graph shows how an increase in A (e.g., industrialization or science) leads to a proportional decrease in $Anti-A$ (e.g., spiritualization or religion), maintaining balance. The curve represents the inverse relationship, with equilibrium dictated by a constant k , emphasizing the interconnectedness of opposing forces.

This equilibrium is evident across various domains. Let's pick two examples:

- *Industrialization vs. Spiritualization:* As industrialization advances, the spiritual depth of a society often diminishes, and vice versa.
- *Science vs. Religion:* These two paradigms balance each other, representing complementary ways of understanding existence, and adopting ways of living.

Pushing this concept to its logical extreme, one might propose a universal constant:

$$\text{Everything} \times \text{Nothing} = \text{Universal Constant}$$

This formula underscores the interconnectedness of all opposites, suggesting that existence itself is a balanced interplay of extremes.

Law of Anti-Reflexivity

The *Law of Anti-Reflexivity* states that when an idea is reflected upon itself, it tends to distort or negate itself. Repetition or self-referential examination leads to entropy within the idea. For instance:

- *Biological Mixing:* Marriages between close relatives often produce weaker offspring, whereas cross-species hybrids may exhibit superior qualities.
- *Nihilism:* As a philosophy that negates everything, nihilism ultimately negates itself.
- *Art Movements:* Movements like Dadaism, which reject conventions, eventually exhaust their own premise through self-negation.

Law of Complementarity

The *Law of Complementarity* suggests that ideas or entities often seek completion through their opposites.

This principle is evident in:

- *Human Relationships:* The complementary nature of partnerships, such as between men and women, highlights the human desire for wholeness.
- *Aesthetic Theory:* Complementary colors, when combined, create a sense of unity, such as producing white light.

Toward a New Paradigm

Insights into Neutrosophic Philosophy

- *Philosophical Discourse*: Divergent schools of thought often enrich one another by addressing gaps or limitations in their respective frameworks.

Law of Inverse Effect

The *Law of Inverse Effect* asserts that excessive force or repetition in promoting an idea often leads to resistance or rejection. Examples include:

- *Conversion Attempts*: Overzealous efforts to convert someone to a belief often result in aversion.
- *Poetry vs. Philosophy*: Poetry, with its indirect and evocative nature, often conveys philosophical truths more effectively than philosophy itself.

Law of Joined Disjointedness

The *Law of Joined Disjointedness* highlights the shared elements between and , suggesting that boundaries between opposites are often porous. Examples include:

- *Good and Bad*: Moral categories overlap and are context-dependent.
- *Consciousness and Unconsciousness*: These states are interconnected, influencing and shaping one another.
- *Finite and Infinite*: The concept of microinfinity illustrates the continuum between finite and infinite realms.

Law of Universal Ideational Gravitation

This *Law of Universal Ideational Gravitation* posits that ideas $[A]$ are naturally drawn toward their complements $[\text{neut}A]$, not merely their opposites $[\text{anti}A]$. This gravitational pull is dynamic and nonlinear, with ideas approaching, influencing, and diverging from one another over time. For instance:

- *Peter Principle*: Individuals tend to rise to their level of incompetence, illustrating the tension between capability and aspiration.
- *Ideational Orbits*: Ideas attract a multitude of complementary and opposing notions, creating a dynamic system of interaction.

The movement of ideas mirrors celestial mechanics, with critical points of attraction and repulsion shaping their trajectories.

Mathematization of Philosophy

These laws suggest a mathematization of philosophy—not in a Platonic sense of eternal forms but *as a dynamic framework capturing the fluid interplay of ideas*. By employing mathematical and conceptual models, we can better understand the evolution, interaction, and transformation of philosophical notions.

For instance, the relationships between ideas can be explored through differential equations, mapping the critical points and trajectories in an abstract “philosophical space.” This approach bridges the gap between abstract thought and empirical analysis, offering a structured way to investigate the ideational dynamics.

Toward a Philosophy of Creative Ideation

Philosophy thrives on diversity, contradiction, and transformation. This neutrosophic approach invites us to see philosophy not as a series of isolated doctrines but as a living, interconnected system. Through the mathematization of thought and the recognition of underlying patterns, we can transcend the limitations of traditional framework, and see philosophy as a dynamic of creative ideation.

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Insights into Neutrosophic Philosophy

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Neutrosophy and Its Philosophical Context. A Comparative Analysis

Neutrosophy, as a new branch of philosophy, represents a significant departure from and extension of traditional philosophical perspectives. It emphasizes the study of neutralities—those ideas, states, or conditions that exist between opposites—and their interactions with ideational spectra.

Neutrosophy, Neutrality, Dialectics, Epistemology, Neutral Monism, Hermeneutics, Philosophia Perennis, Fallibilism, Pluralism, Truth and Falsity, Ambiguity, Complexity, Transdisciplinarity.

This short essay compares neutrosophy to other philosophical frameworks, highlighting both its unique contributions and its connections to established traditions.

Neutrosophy and Dialectics

Dialectical philosophy, rooted in Yin Yang of ancient Chinese philosophy¹ and much later in Hegelian thought,² focuses on the interplay between oppositional propositions—*thesis* and *antithesis*—resolving their conflict in a *synthesis*. This method is fundamentally binary, emphasizing opposites and their reconciliation.

¹ The Yin-Yang concept dates back to at least the 3rd millennium BCE, with its philosophical foundations emerging during the Zhou Dynasty (1046–256 BCE). It was first systematically discussed in the I Ching (Book of Changes), an ancient Chinese divination text written around 1000 BCE. By the Warring States period (475–221 BCE), Yin-Yang theory became a core part of Chinese thought, especially through the works of Zou Yan (305–240 BCE), a philosopher from the School of Yin-Yang (Yinyangjia). His teachings integrated Yin-Yang with the Five Elements (Wu Xing) theory, influencing Chinese medicine, cosmology, and governance. Over time, Yin-Yang became deeply embedded in Confucianism, Daoism (Taoism), and Traditional Chinese Medicine, shaping Chinese culture for thousands of years. See, e.g., The Editors of Encyclopaedia Britannica. "yinyang". Encyclopedia Britannica, 15 Feb. 2025, <https://www.britannica.com/topic/yinyang>. Accessed 23 February 2025.

² Maybee, Julie E., "Hegel's Dialectics", *The Stanford Encyclopedia of Philosophy* (Winter 2020 Edition), Edward N. Zalta (ed.), <https://plato.stanford.edu/archives/win2020/entries/hegel-dialectics>.

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In contrast, neutrosophy moves beyond this binary framework by incorporating the spectrum of neutralities [Neut-A] between opposing ideas [A] and [Anti-A]. For neutrosophy, the *neutral space is not merely a transition but a field of its own*, rich with potential for understanding and creativity. For example, where dialectics might focus on the conflict between “freedom” and “oppression,” neutrosophy explores the nuances of “conditional freedom,” “indifferent states,” or other intermediate concepts, offering a more granular view.

Neutrosophy and Epistemology

Epistemology traditionally investigates the nature, scope, and limits of knowledge, focusing on defining the conditions under which propositions are justified or true.³ This often involves analyzing oppositional pairs, such as *knowledge* versus *ignorance* or *truth* versus *falsehood*.

Neutrosophy, however, transcends these limits by analyzing the entire spectrum of possibilities surrounding an entity (*E*), including its derivatives (*E'*) and neutralities (*Neut-E*). While epistemology seeks to understand the boundary conditions of knowledge, neutrosophy explores what lies beyond these boundaries, incorporating states of partial knowledge, indeterminacy, and neutrality. For example, in the context of a scientific theory, epistemology might ask whether the theory is true or false, whereas neutrosophy would also examine the degrees to which the theory is uncertain, incomplete, or neutral relative to competing theories.

Neutrosophy and Neutral Monism

Neutral monism posits that ultimate reality is neither mental nor physical but composed of a neutral substance that underlies both. This perspective challenges dualistic views by seeking a unified explanation for all phenomena.⁴

Neutrosophy builds on and extends this idea by rejecting monism in favor of a vastly pluralistic view. It posits that the world consists of infinitely many ultimate substances, each with its own spectrum of truth, falsity, and

³ Steup, Matthias and Ram Neta, “Epistemology”, *The Stanford Encyclopedia of Philosophy* (Winter 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/win2024/entries/epistemology/>.

⁴ Griffin, Nicholas. “Neutral monism,” 1998, doi:10.4324/9780415249126-N035-1. *Routledge Encyclopedia of Philosophy*, Taylor and Francis, <https://www.rep.routledge.com/articles/thematic/neutral-monism/v-1>

indeterminacy. While neutral monism reduces complexity to a singular neutral foundation, neutrosophy embraces and analyzes the diversity of neutralities, exploring their interactions with opposites and derivatives.

Neutrosophy and Hermeneutics

Hermeneutics, the art and science of interpretation,⁵ focuses on understanding and explaining texts, events, or phenomena.

It is inherently retrospective, aiming to uncover meaning within established frameworks. Neutrosophy, by contrast, is both interpretive and generative. It not only analyzes existing ideas but also creates new ones by exploring the instabilities and neutralities within systems. Hermeneutics might interpret a text's conflicting themes of order and chaos, whereas neutrosophy would also examine the neutral states—ambiguity, transition, or compromise—and use these insights to propose new interpretations.

Neutrosophy and *Philosophia Perennis*

The *Philosophia Perennis* seeks universal truths underlying contradictory viewpoints, emphasizing the shared essence of diverse philosophical traditions.⁶

Neutrosophy complements this by incorporating neutral truths—those that are neither fully aligned with nor opposed to traditional dichotomies. It acknowledges the existence of neutral perspectives that are often overlooked in the search for commonality among opposites. For example, in religious philosophy, *Philosophia Perennis* might reconcile theism and atheism through shared ethical principles, while neutrosophy would explore agnosticism or apatheism as neutral standpoints with their own validity.

Neutrosophy and Fallibilism

Fallibilism holds that all beliefs are subject to uncertainty and that no proposition can be known with absolute certainty.

⁵ Inwood, Michael. "Hermeneutics," 1998, doi:10.4324/9780415249126-P023-1. *Routledge Encyclopedia of Philosophy*, Taylor and Francis, <https://www.rep.routledge.com/articles/thematic/hermeneutics/v-1>

⁶ Accendere, P.D. (2020). "Philosophia Perennis." In: Sgarbi, M. (eds) *Encyclopedia of Renaissance Philosophy*. Springer, Cham. https://doi.org/10.1007/978-3-319-02848-4_1034-1

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This perspective aligns with the acknowledgment of human fallibility and the provisional nature of knowledge.⁷

Neutrosophy diverges by allowing for 100% true or false assertions within specific referential systems while simultaneously investigating the conditions under which uncertainty approaches zero or 100. This nuanced approach recognizes that certainty is context-dependent and explores how different systems influence the degrees of truth, falsity, and indeterminacy. For instance, a mathematical theorem may be 100% true within its axiomatic framework but indeterminate in a philosophical or metaphysical context.

Neutrosophy and the Exploration of Liminality

The concept of liminality, as initially introduced by Arnold van Gennep [Van Gennep] and later expanded by Victor Turner [Turner], fits well within a neutrosophic lens. Liminality, in its essence, is a threshold space where identities, roles, and statuses are suspended or redefined, leading to a new state of being. This transitional space is marked by a de-regulation of established truths, societal structures, and norms, creating a fertile ground for ambiguity and transformation—much like the neutrosophic idea of indeterminacy, where multiple possibilities coexist and evolve.

Where other philosophical systems might view liminality as a temporary phase, a bridge between two distinct states, neutrosophy sees it as a realm of its own, rich with potential and significance, a state of dynamic flux, where identities are fluid, and possibilities are abundant.

Van Gennep's stages of transition—*pre-liminal*, *liminal*, and *post-liminal*—reflect a progression through varying degrees of truth and falsity. The pre-liminal state represents the established order, a familiar truth. The liminal phase embodies uncertainty, where old truths are challenged and new possibilities emerge, and the post-liminal phase signifies the integration of a new truth or state of being. This transition reflects the movement from a known, structured reality to a space of flux, and ultimately into a new order, similar to the neutralization of conflicting elements in neutrosophy.

Victor Turner's expansion on liminality highlights the ambiguity and paradox of the liminal person, who exists between roles and identities, often defined by a set of symbols and undefined characteristics.

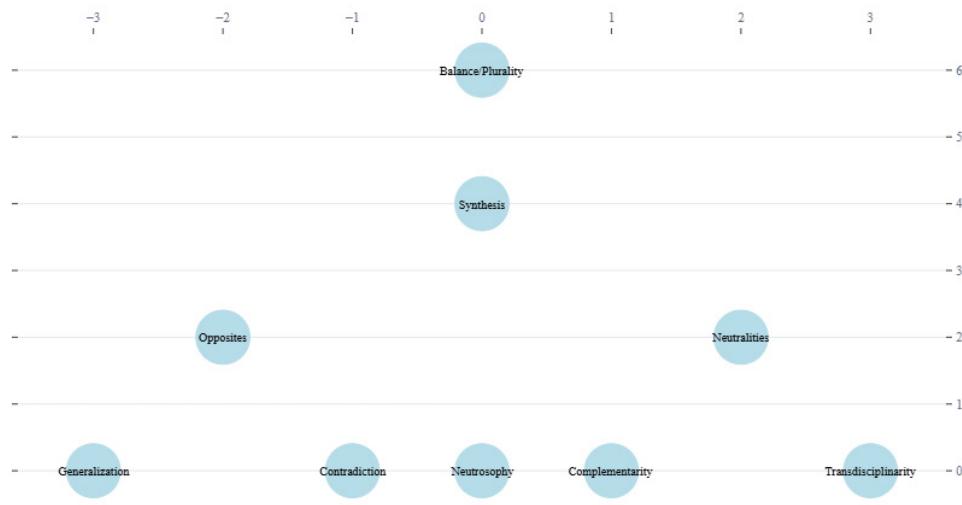
⁷ Rescher, Nicholas. "Fallibilism," 1998, doi:10.4324/9780415249126-P019-1. Routledge Encyclopedia of Philosophy, Taylor and Francis, <https://www.rep.routledge.com/articles/thematic/fallibilism/v-1>

This condition of ambiguity aligns with neutrosophy's embrace of contradictions and uncertainties, as it allows for multiple, even conflicting, interpretations of identity and status. Turner's notion of "communitas," the bond formed among those sharing the liminal experience, can be understood as a form of neutrosophic unity—one that transcends the traditional categories of social order, uniting individuals in a shared, transformative state.

Moreover, Turner's concept of the "liminoid" further exemplifies the neutrosophic dimension of liminality. A liminoid experience, while still liminal, lacks the depth of transformation and community associated with traditional rites of passage. It suggests a superficial or artificial liminality, one that exists outside the confines of ritual and genuine transition, yet still reflects the indeterminate state between structure and anti-structure, between truth and falsity.

Neutrosophy as a Synthesis of Opposites and Neutralities

Ultimately, neutrosophy distinguishes itself by integrating the study of opposites with the study of neutralities. Its methods—such as generalization, contradiction, complementarity, and transdisciplinarity—enable it to address the nuanced realities of a world characterized by indeterminacy.



Graph 8. Neutrosophy: Synthesis of Opposites & Neutralities

Toward a New Paradigm

Insights into Neutrosophic Philosophy

Toward a Synthesis of Opposites and Neutralities

Neutrosophy offers a radical rethinking of philosophy by expanding the scope of inquiry to include not only opposites but also the neutralities and derivatives that connect them. It synthesizes and extends traditional perspectives, providing a versatile framework for understanding complexity and ambiguity. It is not merely a philosophy of neutrality but a philosophy of balance, plurality (or rather *multiality*).

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New Frontiers of Neutrosophic Philosophy

Philosophy, traditionally grounded in the structures of language, rationality, and binary oppositions, must evolve to encompass the full spectrum of human inquiry—beyond words, beyond dichotomies, and into realms where ideas manifest in tangible, intangible, and liminal forms. Neutrosophy, as a revolutionary philosophical framework, extends this exploration by introducing an expanded lens that incorporates neutrality and its dynamic interplay with affirmation and negation.

Object-Oriented Philosophy, Neutrosophic Spectrum, Material Semiotics, Phenomenology, Aesthetics, Philosophy of Art, Visual Semiotics, NonPhilosophy, Posthumanism, Cognitive Pluralism, Speculative Reasoning, Thought Experiments, Conceptual Innovation, Paradoxes, Practical Wisdom, Existentialism, Neutrosophic Pragmatism, Aphoristic Philosophy, Fuzzy Logic, Trichotomous Reasoning, Neutrosophic Continuum.

This essay delves into eight emerging philosophical paradigms—object philosophy, concrete philosophy, sonorous philosophy, fuzzy philosophy, applied philosophy, experimental philosophy, futurist philosophy, and nonphilosophy—each defined through a neutrosophic perspective. These paradigms collectively dissolve traditional boundaries, revealing a multidimensional, fluid interplay of ideas.

Object Philosophy

Objects—whether a skyscraper, a blooming flower, or a bird in flight—are not mere material entities but vessels of profound, unspoken ideas. Traditional philosophy often attempts to capture their essence through words, yet this act distorts their innate poetry and motion, reducing living phenomena to static abstractions. Object philosophy through a neutrosophic lens demands a universal, non-verbal language, resonant with intuition and immediate perception.

Toward a New Paradigm

Insights into Neutrosophic Philosophy

Consider Heidegger's concept of *Dasein*,¹ which emphasizes being-in-the-world. The essence of *Dasein*, like that of a flower in bloom, resists precise articulation. A flower embodies growth, decay, and beauty—a triadic spectrum of existence:

- *Affirmation*: The flower exists, inspiring through its presence.
- *Negation*: Its beauty is transient, destined to fade.
- *Neutrality*: Its meaning fluctuates, shaped by the observer's perception.

In this way, object philosophy reveals the silent, philosophical eloquence of things—where words fail, objects speak.

Concrete Philosophy

Art, particularly visual expression, transforms abstract ideas into tangible realities. A canvas, a mural, or a drawing is not merely aesthetic but inherently philosophical. **Concrete philosophy**, within the neutrosophic framework, highlights the interplay between representation and interpretation:

- *Affirmation*: The artwork asserts itself as a reality.
- *Negation*: It abstracts from the physical world, defying literalism.
- *Neutrality*: It occupies a subjective space, open to fluid interpretation.

Take Van Gogh's *Starry Night*.² Beyond its visual appeal, it reflects on chaos, order, human yearning. Its brushstrokes are a dialogue between the cosmos and the human spirit, illustrating the fusion of philosophy and art.

Sonorous Philosophy

Sound, in its myriad forms, speaks directly to human emotion and intuition. From the structured harmony of a symphony to the dissonance of urban cacophony, **sonorous philosophy** explores sound as a medium for thought, rich with neutrosophic dynamics:

- *Affirmation*: Sound articulates ideas, evoking emotions and reflections.

¹ Heidegger introduced the concept of *Dasein* in his magnum opus, *Being and Time*, published in 1927. *Dasein* is a German word that literally translates to “being there” or “there-being.” Heidegger uses the term *Dasein* to refer to the unique way in which human beings exist. It's not simply about being alive, but about the way we are in the world, our understanding of our own existence, and our relationship to Being itself.

² “The Starry Night” is an iconic oil-on-canvas painting by the Dutch Post-Impressionist artist Vincent van Gogh. Painted in June 1889, it depicts the view from the east-facing window of his asylum room at Saint-Rémy-de-Provence, just before sunrise, with the addition of an imaginary village.

- *Negation*: It defies fixed meanings, subject to individual interpretation.
- *Neutrality*: It bridges abstraction and reality, transcending categorization.

John Cage's "4'33""³ exemplifies this philosophy. In this iconic piece, silence becomes sound, challenging distinctions between music and non-music, and affirming the neutrality inherent in perception.

Fuzzy Philosophy

Traditional philosophy often operates within rigid dichotomies—true/false, being/non-being. Fuzzy philosophy, inspired by neutrosophic logic, replaces these absolutes with gradients and probabilities, reflecting the ambiguity and complexity of reality.

For example, a philosophical proposition may be 70% true, 20% indeterminate, and 10% false. This trichotomy expands into a continuum, where truth, falsity, and neutrality coexist dynamically. Neutrosophic logic embraces contradictions, not as errors but as integral elements of existence.

Applied Philosophy

Philosophy often dwells in abstraction, but applied philosophy focuses on bridging theory and practice. Proverbs, aphorisms, and parables distill profound ideas into accessible forms, embodying philosophical principles in everyday contexts.

From a neutrosophic perspective:

- *Affirmation*: Applied philosophy provides practical insights.
- *Negation*: Simplification may obscure nuance.
- *Neutrality*: It harmonizes abstract thought with lived experience.

For instance, the saying “The journey of a thousand miles begins with a single step”⁴ encapsulates existential truth while serving as pragmatic advice.

³ John Cage's "4'33"" is a three-movement composition that was first performed in 1952. The score indicates that no intentional sounds are to be made by the performer(s) during the piece. The work became one of the most controversial and discussed pieces of music of the 20th century. See: https://johncale.org/pp/John-Cage-Work-Detail.cfm?work_ID=17#:~:text=Composed%20in%201952,N.Y.%2C%20August%2029%2C%201952.&four%20minutes%20thirty%2Dthree%20seconds.&This%20is%20Cage's%20famous%20silent%20piece.

⁴ This proverb is often attributed to the ancient Chinese philosopher Lao Tzu, although there is some debate about its exact origin.

Toward a New Paradigm

Insights into Neutrosophic Philosophy

Experimental Philosophy

Experimental philosophy ventures into speculative territories, probing questions that challenge conventional reasoning. Through thought experiments and unconventional inquiries, it thrives on the intersection of the conceivable and the unimaginable.

Neutrosophically, experimental philosophy affirms creativity, negates rigid frameworks, and neutralizes binary categorizations. The “brain in a vat” scenario,⁵ for example, destabilizes assumptions about perception and reality, existing as both a serious inquiry and a playful paradox.

Futurist Philosophy

As artificial intelligence generates ethical, aesthetic, and metaphysical ideas, futurist philosophy emerges as a dialogue between human and machine cognition. From a neutrosophic perspective:

- *Affirmation*: Machines contribute unique philosophical insights.
- *Negation*: They challenge the anthropocentric nature of philosophy.
- *Neutrality*: They blur distinctions between human and artificial thought.

This paradigm prompts a reevaluation of what constitutes thinking, creativity, and consciousness.

NonPhilosophy

Paradoxically, nonphilosophy generates philosophical reflection through absence and negation. A blank page, a natural landscape, or even graffiti provoke thought without explicit intent, embodying neutrosophic principles:

- *Affirmation*: It invites interpretation and contemplation.
- *Negation*: It resists conventional meaning.
- *Neutrality*: It exists as both absence and potentiality.

This approach underscores the idea that everything—from silence to chaos—holds philosophical significance.

⁵ McKinsey, Michael, “Skepticism and Content Externalism”, *The Stanford Encyclopedia of Philosophy* (Spring 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/spr2024/entries/skepticism-content-externalism>

Neutrosophic Aesthetics

Aesthetics, the branch of philosophy concerned with beauty and taste, finds a natural home within the neutrosophic framework. Traditional aesthetics often grapples with defining beauty as either objective or subjective. **Neutrosophic aesthetics** transcends this limitation, recognizing that beauty can simultaneously possess elements of both objectivity and subjectivity, as well as a neutral or indeterminate component.

Consider a sunset. While its physical properties (wavelengths of light, atmospheric conditions) can be objectively measured, the experience of its beauty is deeply subjective, varying from person to person. Furthermore, there may be moments within the sunset's duration where its aesthetic impact is neither strongly felt as beautiful nor as non-beautiful, but rather as something in between, a moment of aesthetic neutrality. Neutrosophically, we can analyze aesthetic experience along these lines:

- *Affirmation*: The experience is perceived as beautiful, evoking positive emotions and sensations.
- *Negation*: The experience is perceived as not beautiful, perhaps even unpleasant or jarring.
- *Neutrality*: The experience is perceived as aesthetically neutral, neither beautiful nor not beautiful, perhaps simply unremarkable or in a state of transition.

A piece of music, for example, might be considered beautiful in its overall composition (*affirmation*), but contain dissonant passages that are perceived as jarring or unpleasant (*negation*), while other sections might simply be perceived as filler or transitional (*neutrality*).

The intricate patterns of a fractal, for example, can be both chaotic and beautiful, challenging traditional notions of aesthetic harmony.

Toward a Transcendent Philosophy

These paradigms—object, concrete, sonorous, fuzzy, applied, experimental, futurist, nonphilosophy, aesthetics—reimagine philosophy as a multidimensional exploration of existence. Through the neutrosophic lens, they affirm, negate, and neutralize traditional boundaries, transforming philosophy into a dynamic, fluid, and inclusive discipline.

Toward a New Paradigm

Insights into Neutrosophic Philosophy

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Expanding the Horizons of Philosophy through Neutrosophic Movements

Philosophy is characterized by its rich diversity of methods and schools of thought. Beneath this diversity, however, lies a subtle but profound unity: the interrelation of affirmation, negation, and neutrality. A neutrosophic perspective reveals that philosophical movements are not *isolated ruptures* from tradition but are *dynamic threads* interwoven into a larger intellectual tapestry.

Neutrosophy, Philosophical Movements, Revisionism, Inspirationalism, Recurrentism, Sophisticalism, Rejectivism, Paradoxism, Philosophy of Contradiction, Affirmation, Negation, Neutrality, Philosophical Diversity, Existentialism, Dynamic Philosophy.

This short essay briefly examines six philosophical movements—revisionism, inspirationalism, recur-rentism, sophisticalism, rejectivism, and paradoxism—through the lens of neutrosophy, illustrating how each contributes to the evolving landscape of philosophy.

*Revisionism: Philosophy as a *Summum Bonum**

Revisionism calls for a comprehensive reexamination of all philosophical systems, thinkers, and schools, with the aim of redefining philosophy as a unified *summum bonum*—the highest good.¹ From a neutrosophic standpoint, this movement highlights the necessity of engaging with prior systems through a triadic process of affirmation (T), negation (F), and neutrality (I).

¹ Gkotzidis, Evi (2001). "Revisionism and Postmodernism." *Études irlandaises*, 26-1:131-157. DOI: 10.3406/irlan.2001.1561. Available online: www.persee.fr/doc/irlan_0183-973x_2001_num_26_1_1561. Accessed 10 February 2025.

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Insights into Neutrosophic Philosophy

A revisionist approach does not discard the past but reinterprets it. For example, revisiting metaphysical paradigms such as Aristotle's teleology or Kant's transcendental idealism requires recognizing their strengths, weaknesses, and neutral contributions.² In this way, revisionism views philosophy not as a hierarchical contest among competing schools but as a continuum of insights.

Inspirationalism: The Quest for Originality

Inspirationalism seeks to generate originality by drawing upon the past and present, fostering a creative synthesis between tradition and innovation.³ From a neutrosophic perspective, this process involves exploring the interstitial spaces between influence and originality.

Every original concept carries the imprint of its inspirations. Neutrosophy reframes these imprints not as constraints but as neutral zones of potential, enabling the fusion of old and new into transformative insights. Heidegger's existentialism, informed by ancient Greek philosophy and contemporary phenomenology, exemplifies this dynamic, blending affirmation of tradition with groundbreaking innovation.

Recurrentism: The Infinite Cycle of Ideas

Recurrentism posits that philosophical ideas arise from a continuous cycle, where each idea builds upon its predecessors and seeds future developments.⁴ Neutrosophy enriches this perspective by emphasizing that these cycles are neither strictly linear nor deterministic but involve oscillations across affirmations, negations, and neutral zones of reinterpretation.

For instance, the Enlightenment's emphasis on reason emerged as a response to medieval scholasticism, which itself drew from classical philosophy. Each recurrence reinterprets prior insights, creating a dynamic interplay between continuity and novelty. Neutrosophically, these cycles also encompass neutral zones—moments where ideas are neither wholly derivative nor entirely innovative but exist as a fusion of both.

² The Editors of Encyclopaedia Britannica. "revisionism". *Encyclopedia Britannica*, 7 Aug. 2008, <https://www.britannica.com/topic/revisionism-Marxism>. Accessed 16 February 2025.

³ "Inspirationism, N." *Oxford English Dictionary*, Oxford UP, December 2023, <https://doi.org/10.1093/OED/9430949387>. Accessed 16 February 2025.

⁴ Correia, Fabrice; Rosenkranz, Sven (2011). "Recurrentism." In: *As Time Goes By. Eternal facts in an Ageing Universe*, pp. 87–94. Brill. DOI: https://doi.org/10.30965/9783957438898_008.

Sophisticalism: Embracing Ambiguity and Abstraction

Sophisticalism celebrates the ambiguous, abstract, and often unintelligible aspects of thought, framing obscurity as a philosophical virtue. While this approach might seem esoteric or indulgent, a neutrosophic lens reinterprets it as an exploration of the indeterminate spaces between clarity and mystery.

Ambiguity, far from being a weakness, reflects the inherent complexity of reality. The sophistical approach, when viewed neutrosophically, becomes a powerful tool for probing the boundaries of human understanding. [Smarandache, Vladutescu]

Rejectivism: The Dialectic of Rejection

Rejectivism is characterized by the impulse to reject existing philosophical systems as a means of establishing new ones.⁵ While this may appear purely oppositional, neutrosophy reveals its inherent duality: rejection is both a negation of external ideas and an affirmation of alternative perspectives, mediated by a neutral space of transformation.

For example, Spinoza's rejection of Cartesian dualism was not merely a critique but a constructive act, resulting in a monistic framework that redefined substance and mind. In this sense, rejectivism is not destructive but reconstructive, reshaping philosophy through a dynamic process of affirmation and negation.⁶

Paradoxism: The Implicit Contradiction

Paradoxism asserts that every philosophical idea is simultaneously true and false, embracing contradiction as a fundamental aspect of reality.⁷

This perspective aligns seamlessly with neutrosophy, which recognizes contradiction as intrinsic to nature. Paradoxism's core principle—"nothing is non-contradictory"—challenges the binary logic of classical thought.

⁵ Martin, Ben (2016). "Rejectivism and the Challenge of Pragmatic Contradictions." *Disputatio* 8 (43):260.

⁶ Humberstone, Lloyd (2000). "The revival of rejective negation." *Journal of Philosophical Logic* 29 (4):331-381.

⁷ "pARadOXisM – the Last Literary, Artistic, Philosophic and Scientific Vanguard of the Second Millennium", edited by C. Le, <https://fs.unm.edu/a/paradoxism-en.htm>

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Consider Zeno's paradoxes, which both deny and affirm the coherence of motion. Paradoxism does not attempt to resolve contradictions but instead treats them as essential truths.

Neutrosophy extends this approach, showing that contradictions are not obstacles but opportunities to explore the deeper complexities of thought.

Toward a Holistic Philosophy

Each of these movements—*revisionism, inspirationalism, recurrentism, sophisticalism, rejectivism, and paradoxism*—offers a unique lens through which to understand the evolution of philosophy. Through a neutrosophic perspective, these movements reveal that no idea or system is wholly true or false; all exist within a continuum of affirmation, negation, and neutrality. By transcending the silos of traditional schools of thought, neutrosophy fosters a deeper engagement with ideas, not as isolated entities but as dynamic elements.

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Neutrosophic Transdisciplinarity and the Philosophy of Multi-Space

The pursuit of human knowledge has traditionally been organized into distinct disciplines—such as physics, philosophy, biology, and mathematics. This compartmentalization, while useful in many contexts, fails to capture the complexity and fluidity of reality.

Neutrosophy, Neutrosophic Transdisciplinarity, Multi-Space, Multi-Structure, Multi-Concentric-Structures, Transdisciplinary Knowledge, Philosophical Boundaries, Complex Systems, Relational Knowledge, Interdisciplinary Interactions, Scientific Transdisciplinarity, Cultural Transdisciplinarity, Dynamic Knowledge Systems, Vague Boundaries, Multi-valued Logic, Nested Structures, Evolution of Ideas, Philosophical Synthesis.

Neutrosophic Transdisciplinarity,¹ a framework rooted in the principles of neutrosophy, offers a paradigm shift, enabling us to bridge these gaps. By focusing on the intersections where uncertainty and complexity thrive, neutrosophic transdisciplinarity challenges conventional disciplinary boundaries and facilitates the exploration of knowledge in its interconnected, evolving form.

Neutrosophic Transdisciplinarity: A New Approach to Understanding Knowledge

At the heart of Neutrosophic Transdisciplinarity is the recognition that knowledge is not confined to rigid categories but is instead characterized by uncertainty, vagueness, and the fluid interplay of opposing concepts. In neutrosophic terms, this can be understood as the intersection of a concept $[A]$, its anti-concept $[\text{anti}A]$, and its neutralities $[\text{neut}A]$ —entities that do not exist in isolation but overlap to form a space of possibilities. This interplay can be expressed as:

$$[A] \cap [\text{Neut}A] \cap [\text{Anti}A] = \text{all}$$

¹ More info: <https://fs.unm.edu/NeutrosophicTransdisciplinarity.htm>.

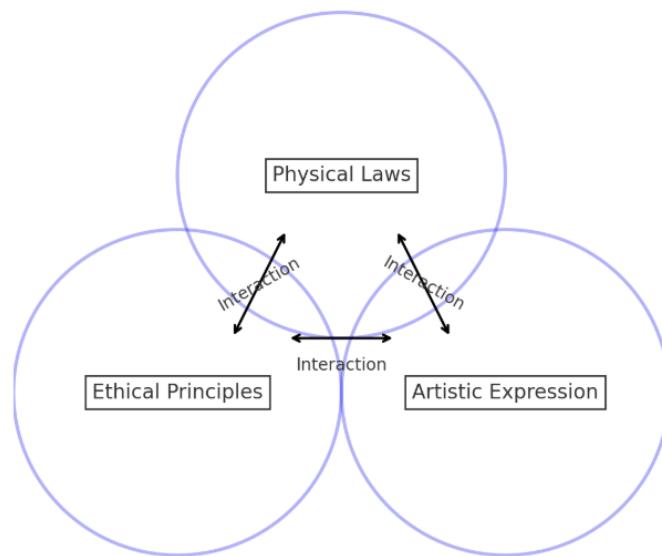
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This formulation highlights the dynamic and non-binary nature of knowledge, where concepts interact in ways that transcend dichotomies, and illustrates the neutrosophic idea that a concept is never purely affirmative or purely negative, existing instead in a state of balance. Through this lens, neutrosophic transdisciplinarity does not seek to impose a universal system of thought but instead explores how diverse concepts, ideas, and fields of study can coexist, inform one another, and evolve together. The key insight is that knowledge should not be seen as a collection of isolated domains but as a interconnected landscape where boundaries are porous, and ideas merge and evolve over time.

Multi-Space and Multi-Structure: Bridging Disciplines

The concept of multi-space² provides a conceptual framework wherein multiple structures can coexist and interact within a single overarching space. In neutrosophic terms, a multi-space represents the overlapping realities that make up our understanding of the world. Each “space” within the multi-space—whether it be physical, cultural, emotional, or intellectual—functions as a distinct structure with its own properties, rules, and assumptions. These structures are not independent but interact with one another, influencing each other, coexisting in tension, or even transforming one another.



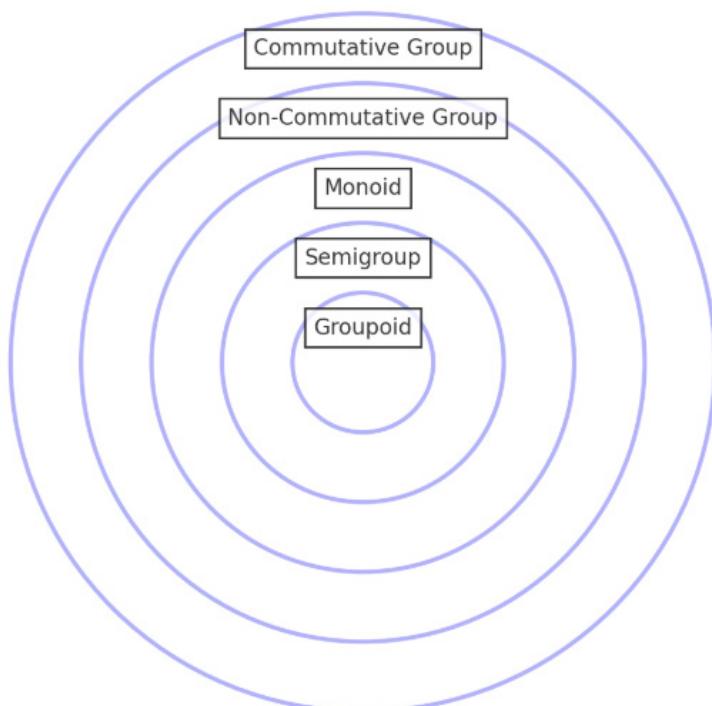
Graph 9. Example of interaction of Multi-Spaces

² More info: <https://fs.unm.edu/Multispace.htm>.

For example, consider a multi-space that includes three distinct domains: one representing the physical laws of the universe (e.g., classical mechanics), another representing ethical principles (e.g., utilitarianism), and a third representing artistic expression (e.g., the composition of a symphony). These domains represent separate structures, but they intersect in the lived experience of a person, whose actions and thoughts cannot be neatly confined to any single discipline. In the neutrosophic view, these overlapping structures are not contradictory; rather, they coexist in a dynamic state of equilibrium.

Multi-Concentric-Structures: Layers of Reality

Building upon the concept of multi-space, the idea of multi-concentric-structures adds another layer of complexity to the neutrosophic view. A multi-concentric-structure consists of multiple nested structures, where each structure is part of a hierarchical organization. In this system, smaller, more specialized structures are encompassed within broader, more general ones. This creates a multi-layered framework of reality, where each level of structure refines and builds upon the ones beneath it.



Graph 10. Multiple Nested Structures

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Insights into Neutrosophic Philosophy

For instance, consider a *groupoid*—a mathematical structure that contains subsets that form progressively specialized structures:

- A *semigroup* (a set with an associative operation),
- A *monoid* (a semigroup with an identity element),
- A *non-commutative group* (a monoid with inverses but without commutative properties),
- A *commutative group* (a non-commutative group with commutative properties).

These structures are not simply discrete or isolated from one another; they form a nested hierarchy, with each level contributing to a deeper understanding of the whole. This concept can be applied beyond mathematics. For example, in cultural systems, specialized cultural practices may be nested within broader societal frameworks, and ethical beliefs may overlap with legal principles, both of which are nested within overarching philosophical systems. The neutrosophic perspective suggests to view these systems as mutually constitutive, and ever-evolving, rather than as distinct and separated entities.

The Neutrosophic Nature of Multi-Structures

In the neutrosophic view, structures are not static; they are in a constant state of flux, shaped by continuous feedback and interaction. Each structure in a **multi-space** or **multi-concentric-system** is not isolated but is influenced by the other structures within it. The definition of any given structure is never fixed; instead, it exists in a dynamic process of adaptation, informed by the forces that act upon it.

Neutrosophy extends this approach beyond traditional binary thinking. Rather than categorizing a structure as either true or false, existent or non-existent, neutrosophy recognizes the intermediate spaces where multiple truth values can coexist.

Philosophical Implications of Neutrosophic Transdisciplinarity

Neutrosophic Transdisciplinarity is not merely about blending ideas from different disciplines; it seeks to understand the deeper relational connections between them. In the context of multi-space and multi-concentric-structures, it highlights the relational nature of knowledge, where value arises from the interactions between different domains.

This perspective encourages us to look beyond the boundaries of individual disciplines, and let us envisage a few expressions of this transdisciplinarity:

Ethical Transdisciplinarity

Ethical dilemmas often require insights from multiple domains—such as science, culture, law, and emotion. Neutrosophic transdisciplinarity helps us navigate these intersections, acknowledging that ethical truths are not absolute but exist in relation to multiple, sometimes contradictory frameworks.

Scientific Transdisciplinarity

Fields like bioinformatics, which combine biology and computer science, exemplify scientific transdisciplinarity. From a neutrosophic perspective, this blending of disciplines is a natural extension of scientific inquiry, where different scientific structures interact to generate new knowledge that transcends the limitations of any one discipline.

Cultural and Social Transdisciplinarity

In a globalized world, cultural systems often overlap and influence one another. Neutrosophic transdisciplinarity allows us to embrace these intersections, recognizing that cultures are not monolithic but consist of overlapping, even contradictory sometimes, structures that shape our understanding of social dynamics.

Toward Transdisciplinary Knowledge

The neutrosophic approach to multi-space and multi-concentric-structures offers a shift in how we understand reality and knowledge. By acknowledging the relational, overlapping, and dynamic nature of different structures, neutrosophic transdisciplinarity provides a framework for integrating ideas across disciplines in ways that accept their complexity.

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Neutrosophy and Infinity: How infinitely big can infinity be?

The concept of infinity has long been a subject of fascination and contemplation in the history of philosophy. From the ancient Greeks to modern mathematicians and philosophers, infinity has been approached from multiple angles—each offering unique insights.

Infinity, Transcendental Ideas, Human Cognition, Dialectical Process, Transfinite Numbers, Cardinality, Paradoxes of Infinity, Neutrosophy, Multiplicity, Ambiguity, Uncertainty, Relational Infinity, Mathematical Abstraction, Neutrosophic Infinity, Dynamic Infinity, Ambiguous Infinity, Infinite Realities.

This essay explores how neutrosophy perceives infinity and contrasts it with other philosophical approaches, such as those of Kant and Cantor, while addressing the question: How infinitely big can infinity be?

A Historical Overview

Before the 19th century, infinity¹ was primarily viewed as a potential concept—something that could go on forever but was never complete. Aristotle² had distinguished between *potential* and *actual infinities*, where potential infinity described an unending process, like counting numbers, and actual infinity referred to a real, measurable infinity (which Aristotle rejected).

¹ Easwaran, Kenny, Alan Hájek, Paolo Mancosu, and Graham Oppy, “Infinity”, *The Stanford Encyclopedia of Philosophy* (Summer 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/sum2024/entries/infinity>. Accessed 15 January 2025.

² Shields, Christopher, “Aristotle”, *The Stanford Encyclopedia of Philosophy* (Winter 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/win2023/entries/aristotle>. Accessed 16 January 2025.

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For Kant,³ infinity is a transcendental idea, meaning that it is not something that can be directly apprehended through sensory experience but is instead a necessary concept for structuring our understanding of the world.

For example, Kant claims that space and time are both infinite in their nature, but this infinity exists only as a condition of possibility for human experience. Infinity, in this view, is not an empirical reality but a fundamental structure of human cognition—an idea we use to make sense of the world.

Similarly, Hegel⁴ presented infinity as the dynamic unfolding of the Absolute. For Hegel, infinity is not a static, unchanging concept but a dialectical process, where the finite and the infinite constantly interact. Infinity becomes a synthesis, not a mere sum of two abstract extremes, but rather a dynamic unfolding that integrates the finite within it.

Both Kant and Hegel see infinity as a necessary conceptual tool for understanding the universe, but they focus primarily on how human thought and experience structure the infinite, rather than examining its inherent qualities or paradoxes. Infinity, in their view, is conceptualized in relation to human limitations and frameworks, making it abstract and distant.

The mathematician Georg Cantor⁵ revolutionized the understanding of infinity with his theory of transfinite numbers. Cantor's work introduced a more sophisticated view of infinity by showing that there are not just infinitely large quantities, but also different types or “sizes” of infinity.

Through his groundbreaking work on set theory, Cantor showed that some infinities are larger than others, even though they are all infinite. This paradoxical nature of infinity is illustrated by Cantor's famous *diagonal argument*, which demonstrates that the set of real numbers is “larger” than the set of natural numbers, despite both being infinite.

However, this view of infinity raises a central paradox: how can two sets, which seem clearly different in nature, still be considered equal in their infinite cardinalities?

³ Bird, Otto Allen, Duignan, Brian. “Immanuel Kant”. *Encyclopedia Britannica*, 10 Feb. 2025, <https://www.britannica.com/biography/Immanuel-Kant>. Accessed 16 February 2025.

⁴ Knox, T. Malcolm. “Georg Wilhelm Friedrich Hegel”. *Encyclopedia Britannica*, 15 Jan. 2025, <https://www.britannica.com/biography/Georg-Wilhelm-Friedrich-Hegel>. Accessed 16 February 2025.

⁵ The Editors of Encyclopaedia Britannica. “Georg Cantor”. *Encyclopedia Britannica*, 2 Jan. 2025, <https://www.britannica.com/biography/Georg-Ferdinand-Ludwig-Philipp-Cantor>. Accessed 1 February 2025.

Types of Infinities

Potential Infinity

This refers to infinity that is never complete or finished, such as an endless sequence or an ever-expanding universe. An example would be the natural numbers: 1, 2, 3, 4, 5, and so on, which continue forever. These are processes or series that do not have an endpoint, meaning you cannot reach the “end” of the numbers by continuing to count or the “end” of the universe by traveling in a spaceship. Aristotle accepted this kind of infinity without issue, recognizing that such infinities existed without causing any philosophical dilemmas in his worldview.⁶

Actual Infinity

This, on the other hand, refers to a completed or concrete infinity that could be measured or observed in a specific location, such as the density of a solid, the brightness of a light, or the temperature of an object becoming infinite at a particular point. Aristotle, however, rejected the idea of actual infinities. He believed that such infinities couldn’t exist in nature.⁷ His view was tied to his belief that a perfect vacuum couldn’t exist, because, if it did, objects would be able to accelerate to infinite speeds without encountering any resistance, thus creating an infinite speed.

Countable Infinity

Cantor introduced the idea of countable infinity—the smallest form of infinity, which includes the set of natural numbers (1, 2, 3, 4, 5, ...). This type of infinity is “countable” because you can list the elements one by one, even though the list goes on forever. A set is countably infinite if its members can be placed in a one-to-one correspondence with the natural numbers. For example, the even numbers (2, 4, 6, 8, ...) are also countably infinite, because you can pair each even number with a unique natural number ($1 \rightarrow 2$, $2 \rightarrow 4$, $3 \rightarrow 6$, etc.). Intuitively, you might think there are fewer even numbers than natural numbers, but in terms of infinity, both sets have the same size. This counterintuitive idea was first noted by Galileo, who found it paradoxical.

⁶ Sharvy, R. “Aristotle on Mixtures.” *The Journal of Philosophy*, vol. 80, no. 8, 1983, pp. 439–457.

⁷ Sachs, J. “Aristotle: Metaphysics.” Internet Encyclopedia of Philosophy, www.iep.utm.edu/aris-met. Accessed 1 February 2025.

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Similarly, Cantor showed that the set of rational numbers (fractions) is countably infinite. Even though it seems like there are more rational numbers than natural numbers, they can still be arranged in a systematic list. One way to do this is to list fractions based on the sum of their numerator and denominator. For example, for the sum 2, there is only one fraction (1/1), for the sum 3, there are two fractions (1/2 and 2/1), and so on. By systematically arranging them in this manner, we can ensure every rational number is listed, proving that the set of rational numbers is countable.

Uncountable Infinity

Some infinities are though uncountable, meaning they cannot be listed in a one-to-one correspondence with the natural numbers. The classic example is the real numbers (the continuum). Unlike the natural numbers or even the rationals, the real numbers cannot be arranged into a list that captures every single one. This is because between any two real numbers, there are infinitely many more real numbers. Cantor's proof (known as the *diagonal argument*) showed that the real numbers form an uncountable set, which is larger than the set of natural numbers.

Absolute Infinity

Cantor also showed that there are infinitely many sizes of infinity. After discovering the uncountable infinity of the real numbers, he showed that you can always create a larger infinity by taking the set of all subsets of a given set. For example, if you take an infinite set, such as the real numbers, and form the set of all its subsets, you get a larger infinity. This process can be repeated indefinitely, creating an endless hierarchy of infinities, with no "largest" infinity—this leads to the concept of absolute infinity.

Mathematical Controversy: Constructivism vs. Neutrosophy

Cantor's revolutionary work on transfinite numbers and the concept of actual infinities deeply transformed the field of mathematics, but it also ignited significant philosophical and mathematical controversy. By extending the idea of infinity beyond the familiar notion of endless processes, Cantor suggested that infinity could be a concrete, measurable entity, capable of being categorized, manipulated, and even quantified. This bold move unsettled many mathematicians, who feared that admitting actual infinities into the mathematical framework could lead to paradoxes and contradictions, potentially undermining the logical consistency that mathematics relied on.

At the heart of these concerns was the fear that the acceptance of infinite quantities, especially when they could be manipulated as actual objects, might destabilize the entire structure of mathematics. In particular, the idea of creating an infinite number of sets, each with an infinity of elements, seemed to invite contradictions that could unravel the axioms on which mathematical systems are built. If contradictions could emerge, the whole edifice of mathematical knowledge could collapse, leaving nothing certain behind.

In response to these concerns, some mathematicians turned to *constructivism* or *finitism*.⁸ These philosophies⁹ argue that mathematical objects should only exist if they can be explicitly constructed through a finite number of steps, each of which is logically determined and verifiable. In constructivist mathematics, only those objects that can be built up step-by-step, from a finite sequence of operations, are considered valid. This approach mirrors the way a computer processes information—by executing a finite series of operations that lead to a definite outcome. Constructivists maintain that by restricting mathematical objects to those that are finitely constructed, paradoxes and contradictions are avoided, ensuring the stability and consistency of the mathematical system.¹⁰

The constructivist philosophy, while influential, remains controversial and is considered more restrictive than Cantor's approach. It limits the scope of mathematics to objects that can be finitely defined or constructed, thus excluding many ideas, such as actual infinities, that Cantor and other mathematicians found central to the theory of numbers and sets.

The debate between constructivist and transfinite approaches reflects a deeper philosophical divide about the nature of mathematics. This division aligns with ideas explored in neutrosophy, which could offer a way of understanding this mathematical debate in regard to the nature of infinity. In neutrosophy, rather than seeking to eliminate contradictions or

⁸ Lemhoff, Rosalie, "Intuitionism in the Philosophy of Mathematics", *The Stanford Encyclopedia of Philosophy* (Summer 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/sum2024/entries/intuitionism>. Accessed 1 February 2025.

⁹ Prominent advocates of constructivism included L.E.J. Brouwer, who championed the idea that mathematics should be grounded in what can be explicitly constructed. Hermann Weyl, a leading figure in 20th-century mathematics, also explored this perspective, though he later adapted his views.

¹⁰ Van Bendegem, Jean Paul, "Finitism in Geometry", *The Stanford Encyclopedia of Philosophy* (Spring 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/spr2024/entries/geometry-finitism>. Accessed 1 February 2025.

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paradoxes, one could embrace them as integral to the broader understanding of infinity. Much like how neutrosophy blends multiple truths, a neutrosophic approach to Cantor's transfinite numbers might acknowledge that actual infinities can coexist with finite structures, challenging the notion that these paradoxes undermine mathematical truth.

From a neutrosophic perspective, the acceptance of actual infinities in Cantor's theory does not need to lead to a collapse of the system, but rather invites a deeper exploration of how seemingly contradictory elements can coexist within the framework of mathematics. Instead of rejecting infinity as an unmanageable or paradoxical concept, neutrosophy might suggest that infinity is inherently layered and multifaceted, just as mathematics contains both countable and uncountable infinities, finite and infinite structures, and both constructive and non-constructive approaches to understanding reality.

Thus, while constructivism restricts itself to finite and tangible entities, neutrosophy, with its embrace of contradiction and fluidity, could allow for a broader, more inclusive exploration of infinity—one that sees paradoxes not as flaws to be fixed but as opportunities for expanding the horizons of understanding.

How Infinitely Big Can Infinity Be?

One of the most captivating questions about infinity is: How infinitely big can infinity be?

Therefore, Kant suggests that infinity, in a transcendental sense, is not bound by empirical limitations and thus can be understood as an infinite horizon—an unending space or time that structures our experience but is never fully grasped. Cantor, with his transfinite numbers, takes this idea further by suggesting that infinity can be categorized into different sizes. The infinite set of real numbers, for instance, is “larger” than the set of natural numbers, even though both are infinite. This reveals the paradox of infinity: it seems that infinity itself can grow larger, that there are infinities within infinities.

In neutrosophy, however, the idea of infinity being “bigger” or “smaller” is not a matter of clear-cut distinctions but rather a continuum of possibilities. Infinity itself is inherently layered, ambiguous, and contradictory. In this framework, infinity may be both infinitely big and infinitely small depending on how it interacts with the finite, the contradictory, and the neutral. Infinity is not just a mathematical object but a concept that evolves and changes depending on context.

In this view, the infinite may not be bound to a “size” at all—it may simply be a condition of possibility for understanding the universe and ourselves. The infinite may exist not only as a theoretical abstraction but as an experiential reality that is felt as an unending process, like an eternal cycle in which we never reach an “end” or a final truth.

The infinity of the universe might be felt as a circular or closed structure where we keep spiraling without ever arriving at a final destination.

Infinitely Small Numbers

The mention of “infinitely small numbers” refers to the concept of infinitesimals. In mathematics, infinitesimals are numbers that are greater than zero but smaller than any positive real number, often used in calculus (e.g., in the concept of limits).

Example: A number like $10^{-1,000,000,000}$ (ten raised to the power of negative one billion) is extremely small, but it is still a real number. Such numbers can be used in various mathematical contexts to approximate real-world phenomena, particularly in calculus when analyzing continuous change.

Infinitesimal numbers are typically conceptualized in the context of limits, where we consider the behavior of a function as its values get closer and closer to zero but never actually reach it.

Infinite Numbers Between Zero and One

This is a well-known property of the real number line. Between any two distinct real numbers, no matter how close they are, there are infinitely many other real numbers. This is known as the *density* of real numbers.

Example: If you pick any two numbers between zero and one (say 0.1 and 0.2), you can always find another number between them (like 0.15, or 0.125). You can repeat this process ad infinitum, showing that there are infinitely many numbers between any two distinct points on the number line.

Even though we are talking about an infinite number of real numbers between any two points, the interval itself (from 0 to 1) is finite, meaning that the length of the interval is bounded (it has a definite size, specifically a length of 1).

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The Infinite Bricks and the Building Paradox

Imagine an infinite number of infinitely small bricks. The question is: if we used all these infinitely small bricks to construct a building, would the total volume of the building be finite or infinite?

This idea brings up several key concepts:

Summing Infinitesimals

In mathematics, if you add infinitely many infinitesimal quantities, the result can still be a finite quantity. This happens, for example, in the *concept of a convergent series*. A classic example is the geometric series:

$$S = 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots$$

The sum of this infinite series is finite, even though it involves adding infinitely many terms. The sum converges to a specific number (in this case, 2).

Volume of the Building

To apply this concept to the “bricks” scenario, one could think of it as a *limit*. If one has an infinite number of bricks, each with an infinitely small size, and one constructs a building by adding them together, one would need to consider whether the total volume converges to a finite value or grows without bound.

If the total volume of the building is *the sum of infinitely many infinitesimal bricks*, it could still result in a finite volume, provided that the size of the bricks diminishes fast enough. This would be analogous to the idea of an infinite series whose sum is finite (such as the infinite sum of smaller fractions mentioned above).

However, if the infinitesimals do not shrink quickly enough, the total volume could become infinite. For example, if the size of the bricks decreases in a way that does not result in a convergent sum, the building’s volume could become infinite.

Philosophical Interpretation

From a philosophical standpoint, the example could be seen as a metaphor for dealing with paradoxes and the limitations of human understanding of infinity. It raises the question of whether something can be infinite in quantity (like the number of bricks) but still result in a finite outcome (like the volume of the building). This is reminiscent of *Zeno’s paradoxes*—the idea that an infinite series of steps can lead to a finite outcome,

or alternatively, lead to a contradiction, depending on how the steps are taken.

In summary:

- *Mathematically*, the sum of infinitely many infinitesimally small numbers can indeed be finite, depending on how those numbers behave (e.g., in a converging series).
- *Philosophically*, the example raises intriguing questions about the nature of infinity and the limits of human reasoning—can something infinite be contained within the finite? This is a classic paradox that has fascinated thinkers for centuries.

So, to answer the specific question: The total volume of the building constructed from infinitely small bricks could be finite, depending on how the sizes of the bricks are defined and summed. If the infinitesimals diminish quickly enough (i.e., the series converges), the total volume remains finite. If not, it could theoretically become infinite.

Infinitely Small Bricks and Measure Zero

Let's start over in exploring the concept of "infinitely small bricks" and what it means for their *measure* to be zero.

Point-Sized Bricks

If each "brick" in the construction is point-sized, then mathematically, each brick has no volume or measure. A point is a mathematical abstraction—it has no length, width, or depth. In the context of the real world, we might think of a point as having size zero, and therefore if you use infinitely many of them, the total measure (or total volume) of the object you're constructing would still be zero.

This is related to the concept of a measure zero set. A measure zero set is a collection of points that, despite potentially being infinite, occupies no space. For example, the set of all rational numbers between 0 and 1, although infinite, has measure zero on the real number line, because it can be covered by intervals of arbitrarily small total length.

Countably Infinite Bricks

If one has a countably infinite number of bricks (bricks you can list one by one, like the natural numbers), and each one is point-sized, the collection of these bricks still has measure zero. Even though one has

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infinitely many of them, the total size of the “building” made from these bricks remains effectively zero, because each brick occupies no space.

This is analogous to the idea of a countably infinite set of points that adds up to zero in terms of size, which leads us to the concept of measure theory. Measure theory helps us formalize the notion of size or volume in more abstract settings, especially when dealing with infinite sets. In this case, a set of countably infinite points, all with zero size, results in a set of measure zero.

Uncountably Infinite Bricks and Infinite Possibilities

Now, if one has an uncountably infinite number of bricks, things get more interesting.

Uncountably Infinite Bricks

A set is *uncountably infinite* if one can't list its elements one by one, as is the case with the real numbers. The set of real numbers between 0 and 1 is an example of an uncountable set.

If one has *uncountably many point-sized bricks*, one may be able to construct an object with nonzero volume. This is because uncountable sets, unlike countable ones, do not behave the same way in terms of measure theory. The power of an uncountable set lies in its ability to “fill” spaces in a way that countable sets cannot.

Infinite Size and Pulling Walls from It

The claim that you can keep pulling walls of the same size from an uncountable collection of bricks “infinitely” and not make the collection any smaller or less dense is connected to the idea that *uncountable sets* can be partitioned and reassembled in unexpected ways, leading to counterintuitive results.

The Banach-Tarski Paradox

The Banach-Tarski Paradox states that:

It is possible to take a solid ball in 3-dimensional space, break it into a finite number of pieces, and then reassemble those pieces (using only rotations and translations, no stretching or bending) into two identical copies of the original ball.

This result is *counterintuitive* because it seems to defy our everyday understanding of volume and space. It appears as though you are multiplying

the volume of a solid object, which violates the basic principles of geometry and conservation of mass.

Here's why this paradox occurs:

Non-measurable Sets

- The paradox hinges on the existence of *non-measurable sets*—sets that do not have a well-defined volume or measure in the conventional sense. These are sets that cannot be assigned a consistent size using traditional methods of measure theory, and they can be constructed using the Axiom of Choice, a powerful but somewhat controversial axiom in set theory.
- The pieces in the Banach-Tarski Paradox are not “regular” geometric objects like cubes or spheres. They are *non-measurable sets* that can be split in ways that don’t correspond to our usual understanding of volume. Because they don’t have a consistent measure, the usual rules about adding volumes do not apply.

Uncountably Infinite Pieces

The paradox involves dividing the ball into *uncountably infinite pieces* and then reassembling those pieces into two identical balls. These pieces cannot be described in simple geometric terms—they are more abstract, and their properties are based on the *mathematical concept of sets* rather than physical objects.

Since the pieces involved are uncountable and non-measurable, the idea of “size” becomes very slippery, and the usual rules of geometry break down. The reassembly doesn’t follow the intuitive rules we apply to everyday objects, leading to the counterintuitive result of duplicating the ball.

The paradox raises the question of whether it’s meaningful to work with point-sized objects (such as the “bricks”). In physical terms, we can’t actually construct objects with zero volume or size. However, in pure mathematics, the notion of point-sized objects, or points, is well-defined.

The Banach-Tarski Paradox illustrates how uncountable sets and non-measurable sets can lead to strange results that defy our intuition about space and volume. When working with point-sized objects, or when dividing a space into an uncountably infinite number of pieces, traditional ideas of measure and volume no longer apply in the same way, opening up a realm where mathematical abstractions behave in ways that seem impossible in the physical world.

Neutrosophy's Perspective on Infinity

Neutrosophy, on the other hand, offers a radically different take on infinity. Whereas Kant and Hegel treat infinity as a transcendental concept or a dialectical process, and Cantor views it as a mathematical construct, neutrosophy regards infinity as an experiential phenomenon that embodies uncertainty, ambiguity, and multiplicity.

In neutrosophy, infinity is not a single, unified concept but exists in multiple forms: small infinities and large infinities are both present but are understood through their interrelationships, contradictions, and neutral zones. Neutrosophy contends that infinity cannot be grasped as a whole because it inherently involves multiple, sometimes contradictory, perspectives.

The concept of neutrosophic infinity introduces *uncertainty* into our understanding of infinite sets, suggesting that rather than being distinct, sets or spaces may overlap, blend, or shift into one another. For example, the boundary between a “finite” and “infinite” space might not be as clear-cut as traditionally thought. A set might be 70% finite, 20% infinite, and 10% contradictory—acknowledging the reality that our perception of the infinite is always in flux, oscillating between different states and levels of awareness.

This fuzzy logic approach to infinity allows us to embrace the paradox of infinity’s vastness without being constrained by the dichotomous thinking of either finite or infinite. In neutrosophy, the infinite is not bound by the constraints of logic but is a space where multiple, sometimes contradictory possibilities coexist.

Neutrosophic Infinity: A Definition

Neutrosophic infinity can be defined as an *experiential, multidimensional, and inherently contradictory concept* of the infinite that transcends traditional dichotomies like “finite” and “infinite.”

Unlike the classical mathematical approach, where infinity is treated as a specific, static, and potentially measurable quantity (whether countable or uncountable), neutrosophic infinity acknowledges the simultaneous coexistence of various states, levels, and forms of infinity.

It is fluid, context-dependent, and non-absolute, allowing for intersecting and overlapping infinities that may vary based on perception, logic, and existential circumstances.

Key Characteristics of Neutrosophic Infinity

Multiplicity and Interconnection

Neutrosophic infinity rejects the traditional view that infinity must be singular or uniform. Instead, it proposes that there are multiple infinities, each potentially overlapping, coexisting, or transforming into one another. These different infinities are not isolated; they are understood in relation to each other and to the finite. For example, the infinite possibilities between two points on a number line are not merely extensions of the finite; they exist in a space where their boundaries and connections are fuzzy and dynamic.

Contradiction and Uncertainty

Neutrosophic infinity integrates contradictory elements within itself. It allows for the coexistence of seemingly opposing properties (e.g., “infinitely large” and “infinitely small”) and sees these contradictions as inherent to the concept of infinity itself. This aligns with neutrosophy’s core principle that truth can be partial, contradictory, or undefined. Therefore, infinity may simultaneously appear as both boundless and constrained, depending on the context.

Non-Absolute and Contextual

Infinity in neutrosophy is contextual, meaning that its characteristics shift depending on the framework in which it is considered. In the realm of mathematics, for example, the infinite might be represented as a set that expands without end. But in the realm of experience, infinity could be felt as an eternal process or as an emotional or spiritual experience that evolves continuously without a final endpoint. Neutrosophy emphasizes that infinity cannot be confined to one specific definition or framework; it is relational rather than absolute.

Fuzzy Logic and Fluid Boundaries

Instead of treating infinity as a well-defined, measurable concept, neutrosophy embraces the fuzzy logic approach, where the concept of infinity is inherently indeterminate. The “boundaries” of what constitutes infinite sets or processes are not rigid. There is a gradual continuum between the finite and the infinite. For example, a set might be 70% finite, 20% infinite, and 10% contradictory, reflecting the complex interplay between what we perceive as finite and infinite.

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Experiential and Existential

Neutrosophic infinity also takes into account human experience and perception. Just as Kant viewed infinity as a transcendental idea tied to human cognition, neutrosophy integrates the subjective and existential aspects of infinity into its framework. Infinity is not simply a mathematical abstraction but a living, evolving experience that can be felt, explored, and processed at both intellectual and emotional levels. It is the infinite unfolding in time, space, consciousness, and being.

Practical Example: The Infinite between Zero and One

In traditional mathematics, we might consider the interval between zero and one as containing *countably infinite rational numbers* (fractions) or *uncountably infinite real numbers*. But from a neutrosophic perspective, this interval does not simply contain infinite numbers; rather, it embodies multiple layers of infinity, each of which can be understood differently depending on the *perspective* or *framework* you adopt. The boundary between the “finite” part of the interval (the numbers close to zero) and the “infinite” part (the infinitely many decimal places) is not sharply defined. Instead, it is fluid, overlapping, and continuously changing as we zoom in on smaller and smaller scales or shift our focus.

Toward a Dynamic Infinity

In contrast to traditional views of infinity that attempt to categorize and limit the infinite, neutrosophy suggests a view of infinity as something dynamic, ambiguous, and deeply interconnected with the finite. Neutrosophy’s infinite is not merely abstract or theoretical, but fuzzy, malleable, and relational—an infinite that cannot be confined to a single idea, structure, or system, something to be fully comprehended but something to be experienced, explored, and integrated into our understanding of the world. In this way, neutrosophy does not simply offer another definition of infinity but invites to live with infinity as an open, evolving concept.

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Neutrosophic Perspectives on the ‘Body’, ‘Mind’, ‘Soul,’ and ‘Spirit’

Let us briefly examine the concepts of the ‘Body’, ‘Mind’, ‘Soul,’ and ‘Spirit’ through the lens of neutrosophy.¹ Since neutrosophy challenges traditional binary logic, positing that ‘truth’ is not a fixed entity, it results that any phenomenon or dynamic structure can exist in different degrees (of truth, indeterminacy, and falsity). By applying this triadic approach to these four components, I propose the notion of a Neutrosophic {Body, Mind, Soul, and Spirit} and discuss its potential implications.

Neutrosophy, Phenomenology, Body, Mind, Soul, Spirit.

Traditional models often present ‘body’ and ‘mind’ as distinct, dualistic components. However, neutrosophy offers a different approach by introducing the concept of indeterminacy. This third ‘state’ challenges binary logic and provides a more fluid, nuanced understanding. Let us introduce here the concept of a Neutrosophic {Body, Mind, Soul, Spirit} and discuss some of its implications. To better understand this concept, I will briefly explore phenomenology, which also challenges Cartesian dualism² by emphasizing the inseparability of ‘body’ and ‘mind’.

¹ A version of this paper, published in: Smarandache, Florentin (2025). “Neutrosophic Perspectives on the Body-Mind-Soul-Spirit Fluidity.” *Neutrosophic Sets and Systems* 78:97-104. https://digitalrepository.unm.edu/nss_journal/vol78/iss1/6

² Robinson, Howard, “Dualism”, The Stanford Encyclopedia of Philosophy (Spring 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.), URL: <https://plato.stanford.edu/archives/spr2023/entries/dualism>. Accessed: 21 May 2024.

Phenomenological Perspective

Phenomenology,³ as explored in the works of Edmund Husserl⁴ and later Maurice Merleau-Ponty,⁵ emphasizes the unity of the self and its experience of the world. This philosophical framework posits that ‘body’ and ‘mind’ are not isolated or separate components. From a phenomenological perspective, human consciousness cannot be reduced solely to thoughts or bodily sensations; instead, it encompasses a lived experience that engages the entire being. This approach highlights the relational and dynamic nature of human existence, where the ‘body’ is not a passive entity but actively shapes the ‘mind’, and influence how a person perceives and interacts with the world.

Edmund Husserl’s goal was to describe the structures of experience as they present themselves to consciousness, free from preconceived notions or theoretical assumptions. His method of *phenomenological reduction* sought to examine the world as directly experienced, devoid of external scientific or metaphysical frameworks. For Husserl, consciousness is inherently intentional—it is always directed towards an object, whether that object is physical or abstract.

Maurice Merleau-Ponty acknowledged Husserl’s emphasis on the first-person perspective and the centrality of lived experience in understanding the world. However, Merleau-Ponty introduced significant modifications, particularly regarding his interpretation of embodiment and perception. One of the key departures in Merleau-Ponty’s phenomenology is his assertion that the ‘body’ is central to perception and experience. While Husserl’s phenomenology initially focused on the structures of consciousness and acts of intentionality—how we direct our attention to objects—Merleau-Ponty emphasized how the ‘body’ shapes our perception of the world. For Merleau-Ponty, the ‘body’ is not merely an object within the world, but rather the primary means through which we engage with and experience the

³ Smith, David Woodruff, “Phenomenology”, *The Stanford Encyclopedia of Philosophy* (Summer 2018 Edition), Edward N. Zalta (ed.), URL: <https://plato.stanford.edu/archives/sum2018/entries/phenomenology>. Accesed: 23 May 2024.

⁴ Beyer, Christian, “Edmund Husserl”, *The Stanford Encyclopedia of Philosophy* (Winter 2022 Edition), Edward N. Zalta & Uri Nodelman (eds.), URL: <https://plato.stanford.edu/archives/win2022/entries/husserl>. Accesed: 23 May 2024.

⁵ Toadvine, Ted, “Maurice Merleau-Ponty”, *The Stanford Encyclopedia of Philosophy* (Winter 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.), URL: <https://plato.stanford.edu/archives/win2023/entries/merleau-ponty>. Accesed: 23 May 2024.

world. He introduced the concept of the *lived body*, emphasizing the 'body' as a subjective entity, and rejected Cartesian 'mind'-body' dualism.

While Husserl's focus on intentionality—how consciousness is always directed toward an object—was foundational, Merleau-Ponty extended this notion by arguing that perception is not merely a mental act but an embodied, situated experience. He asserted that perception is *pre-reflective*, occurring before any conceptualization or mental interpretation.

Whereas Husserl's phenomenology often operated within an intellectual framework that attempted to abstract away from the 'body', Merleau-Ponty's approach remains grounded in the understanding that perception is always shaped by embodied experience. For Merleau-Ponty, bodily existence precedes and structures consciousness.

While Husserl, particularly in his later work, turned towards a more abstract investigation of the structures of consciousness—exploring the *essences* of experiences—Merleau-Ponty consistently focused on the lived world. For Merleau-Ponty, the world is not an external, objective entity to be studied from a detached perspective, but a world that is perceived and experienced in an embodied way. Merleau-Ponty took Husserl's analysis of intentionality and developed it into a more integrated theory of perception and existence.

Merleau-Ponty also critiqued Husserl's reliance on Cartesian distinctions between 'subject' and 'object'. While Husserl believed in the possibility of achieving pure, objective knowledge through phenomenological reduction, Merleau-Ponty was skeptical. For Merleau-Ponty, the subject is always engaged with the world through perception and embodiment, meaning that the 'mind' is never fully detached from the world.

Understanding the Neutrosophic Framework

Neutrosophy asserts that every proposition or phenomenon has three fundamental components: a degree of truth (T), a degree of indeterminacy (I), and a degree of falsehood (F). This triadic framework enables a more complex analysis of phenomena that cannot be reduced to binary categories. Neutrosophy recognizes that truth is not absolute, but can fluctuate across a spectrum, influenced by context, perception, and inherent contradictions. The principle can be applied to the 'body', 'mind,' 'soul,' and 'spirit' framework, each of which being manifested in varying degrees.

This is a model that embraces the fluidity and ambiguity, and from this perspective, the 'body,' 'mind,' 'soul,' and 'spirit' are not fixed categories

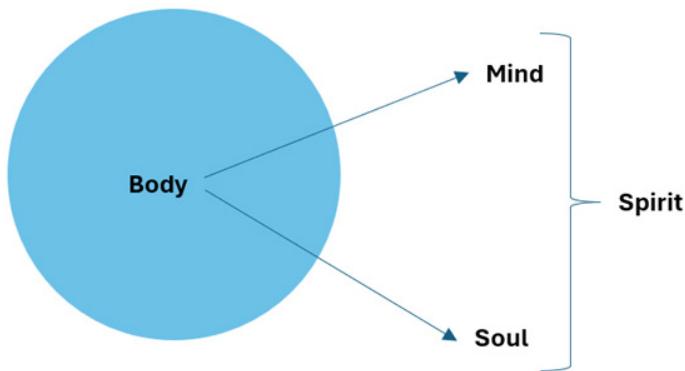
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but interconnected and dynamic aspects of experience that can embody multiple states at once. For example, the ‘body’ can be seen not only as /healthy/ or /sick/ but in states of transition, and the ‘spirit’ may be neither fully /enlightened/ nor completely /disconnected/, but in a state of potential transformation.

The Neutrosophic {Body, Mind, Soul, and Spirit}

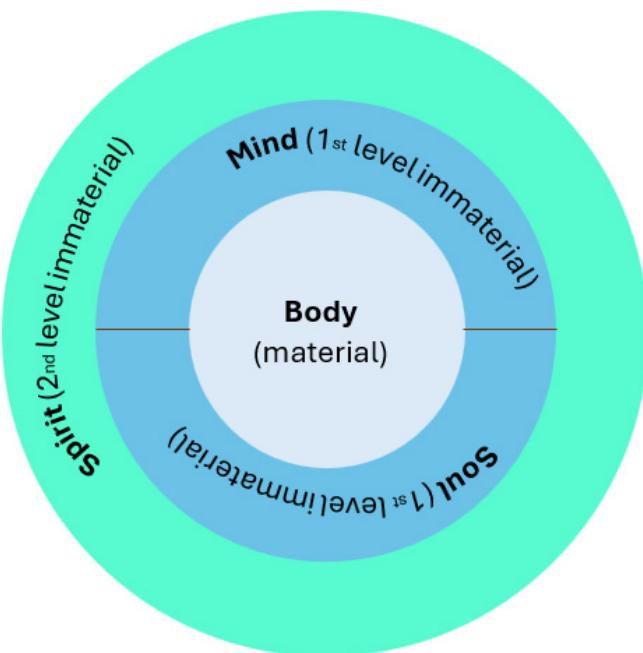
The ‘Neutrosophic Body, Mind, Soul, Spirit’ is a conceptual framework that integrates the traditional components of human existence—body, mind, soul, and spirit—through the lens of neutrosophy.



Graph 11. Implication Diagram

- **Body:** The body represents the physical aspect of a person, subject to biological processes and scientific study. In neutrosophic terms, the body is not simply in a state of health or illness but can also exist in a neutral state, such as transitioning between wellness and disease, growth and decay. Health, therefore, is not a fixed binary but a dynamic process with fluctuating states of balance and imbalance.
- **Mind:** The mind encompasses cognitive functions such as thinking, reasoning, and memory. In neutrosophic thought, the mind is not confined to a rational versus irrational dichotomy. Instead, it can occupy states of indeterminacy, where beliefs, ideas, and perceptions coexist in varying degrees of clarity and confusion. The mind is subject to both logical analysis and emotional influence, which creates a dynamic interplay of truth, ambiguity, and falsehood.

- **Soul:** Traditionally, the soul is seen as the essence or immaterial aspect that animates a person. In a neutrosophic framework, the soul embodies complexities that cannot be reduced to simple categories of good or evil. It may harbor both true aspects of identity (T), uncertain beliefs (I), and false societal constructs (F). The soul, therefore, can fluctuate between harmony and turmoil, light and shadow, embracing a full range of human emotional and spiritual experiences.
- **Spirit:** The spirit is often associated with transcendence or connection to the divine. Neutrosophy suggests that the spirit always exist in a transitional state, moving between moments of clarity and ambiguity, enlightenment and confusion. The spirit may embody truths about divine experiences (T), uncertainties about spiritual beliefs (I), and misconceptions about spiritual practices (F).



Graph 12. Structural Diagram

One of the key insights of neutrosophy is the recognition that these components—body, mind, soul, and spirit—do not function in isolation. Rather, they are interconnected and implicative in dynamic ways.

Implications and Examples (in personal development)

The neutrosophic model encourages a flexible and nuanced approach to personal development, urging individuals to recognize both certainty and uncertainty within themselves. This perspective challenges rigid identity definitions, instead promoting a dynamic understanding of self. In this context, personal growth becomes a journey of navigating these fluctuating states with openness, fostering a deeper connection to both oneself and the external world.

Physical and Mental Health

When a person feels physically depleted (falsehood), this can manifest as mental fog (indeterminate) and a lack of direction (indeterminate). However, after a restful night's sleep (truth), physical recovery (truth) can lead to clearer thinking (more truth) and a renewed sense of purpose (more truth). This demonstrates the interdependence of physical well-being and mental clarity, with each influencing the other in fluid, sometimes indeterminate ways.

Emotional State and Physical Health

Emotional stress (falsehood) can have tangible effects on the body, such as fatigue (indeterminate), which in turn may cloud mental clarity (indeterminate). Yet, practices like mindfulness (truth) can alleviate stress, improving emotional balance (truth) and physical vitality (truth). This example highlights how emotional and physical health are intertwined, constantly shifting in relation to one another.

Spiritual Growth and Cognitive Clarity

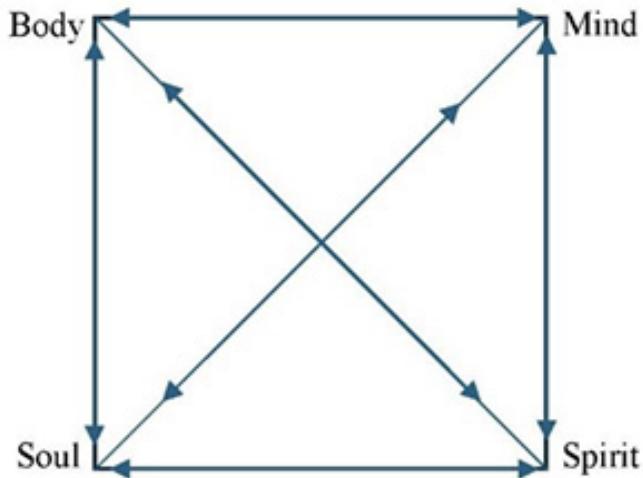
A person experiencing spiritual doubt (falsehood) may notice a corresponding decline in mental focus (falsehood). However, engaging in spiritual practices like meditation or prayer (truth) can restore mental clarity and deepen one's sense of purpose (truth), exemplifying how spiritual exploration impacts cognitive and emotional states. The interplay between the soul and mind is fluid, reflecting both certainty and uncertainty.

Integrating Neutrosophy into Human Understanding

By applying neutrosophic principles to these four components—body, mind, soul, spirit—we can explore how they interact in complex ways: Each component does not exist in isolation; rather, they influence one another.

For instance:

- The body affects mental states through health conditions.
- The mind shapes perceptions of the soul's essence.
- The soul influences spiritual beliefs which may affect mental health.



Graph 13. Neutrosophic Body-Mind-Soul-Spirit Fluidity
[Complete Interplay]

Recognizing this interplay allows for a more holistic view of human beings that acknowledges both certainty and uncertainty in our understanding of self.

Implications for Personal Development

Understanding oneself through this neutrosophic lens encourages individuals to embrace complexity:

- Accepting that there are truths about oneself while also recognizing areas where one feels uncertain or misled.
- Encouraging personal growth by exploring these dimensions without rigid definitions.

This approach fosters an environment where individuals can navigate their identities with greater flexibility and openness to change.

By embracing neutrosophy, individuals can adopt a more holistic approach to life, accepting the complexity and fluidity of their physical, mental, emotional, and spiritual states.

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This framework fosters acceptance of change, growth, and transformation, allowing for ongoing self exploration without the constraints of rigid definitions or static categories. It encourages a lifelong journey of development, where uncertainty is seen as a natural part of the human experience rather than something to avoid.

Toward a Holistic Understanding of Human Existence

The Neutrosophic {Body, Mind, Soul, and Spirit} framework offers a comprehensive and holistic model for understanding human existence. By applying the principles of neutrosophy, we can move beyond dualistic models of truth and engage with the complexity and nuance inherent in human experience. Ultimately, the neutrosophic perspective fosters a more flexible, open, and evolving understanding of the self, promoting personal growth and well-being in a constantly changing world.

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A Neutrosophic Approach to Social Phenomena

Sociology has long sought to understand human societies and the social behaviors within them. It explores the organization, structure, dynamics, and transformations of society over time. However, traditional sociological methods face significant challenges in addressing the complexity and indeterminacy inherent in social data—data that is often ambiguous, incomplete, and contradictory. The Neutrosociology¹ offers a novel approach to studying and modeling social phenomena by employing mathematical and philosophical tools that can accommodate uncertainty.

Neutrosophic Sociology, Neutrosophic Social Systems, Mathematical Models, Social Phenomena, Social Change, Sociological Forecasting, Neutrosophic Probability, Indeterminacy, Social Norms, Sociological Triads, Family Structures, Political Movements, Social Complexity, Truth, Falsehood, Indeterminacy, Gender Constructs, Social Data, Cultural Shifts, Social Science Models, Dynamic Social Systems, Neutrosophy, Sociological Theory.

As a scholar, my interest in the mathematical representation of socio-political events has driven me to explore whether mathematical models, equations, or operators can effectively describe the complexities of social phenomena. This inquiry raised several key questions:

- Can social phenomena be represented mathematically?
- How can we account for the unmodeled aspects of society?
- Is it possible to predict the future trajectories of human societies—what might they look like in one hundred or one thousand years?
- How might future social structures evolve or disintegrate? Will they remain divided by class, or will new forms of organization emerge?

¹ Firstly introduced in my 2019 book: Smarandache, Florentin. (2019). *Introduction to Neutrosophic Sociology (Neutrosociology)*. Brussels: Pons.

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- How will family structures evolve? Will traditional models be replaced by alternatives such as single-parent families, polygamy, polyandry, or even the dissolution of the family unit?
- How can we scientifically forecast social change using methods like Markov chains, and what degree of accuracy can we expect?

To address these questions, I proposed the neutrosophic framework, which is capable of embracing the complexities and uncertainties in social life. By applying neutrosophic logic, set theory, and probability, one can develop more accurate models of social phenomena, incorporating the degrees of truth, indeterminacy, and falsehood that characterize social data.

The Concept of Neutrosophic Sociology (NeutroSociology)

Neutrosophic sociology is grounded in neutrosophy, a philosophical framework that investigates the degrees of truth (T), indeterminacy (I), and falsehood (F) in various domains.

These concepts are crucial in neutrosophic sociology because they allow a more nuanced representation of the contradictory and often uncertain nature of social data.

Traditional sociological data is rarely complete or entirely clear. Instead, it is often ambiguous, contradictory, and incomplete. Neutrosophic sociology provides a method for addressing these imperfections, enabling sociologists to model social facts in terms of their degree of truth, degree of indeterminacy, and degree of falsehood.

This framework allows us to reflect the complexity of social reality with greater accuracy than classical sociological approaches.

For instance, consider the concept of “democracy” as it applies to a country. In conventional sociology, a country is either democratic or it is not. However, a more nuanced analysis reveals that certain laws or policies might not align with democratic principles, or different groups may have conflicting interpretations of what democracy entails.

Using neutrosophic analysis, we can express a country’s democracy as a (T, I, F)-concept, where T represents the degree of truth (e.g., 80% democratic), I represents the degree of indeterminacy (e.g., 10% uncertain), and F represents the degree of falsehood (e.g., 10% nondemocratic).

Neutrosophic Triads and Their Applications

In neutrosophic sociology, triads are employed to model the relationships between a concept (T), its indeterminate counterpart (I), and its opposite or anti-concept (F). These triads provide a framework for understanding the dynamic interplay of concepts within social phenomena.

For example, in a sociological context, the concept of “man” is complemented by the anti-concept “woman,” with “transgender” serving as the indeterminate counterpart.

This triad—[Man, Transgender, Woman]—demonstrates how gender is socially constructed, encompassing varying degrees of truth, indeterminacy, and opposition. Similar triads can be applied to other sociological constructs, such as social class, political affiliation, or family structures.

Furthermore, neutrosophic sociology allows for the decomposition of these triads into subcomponents. For example, when examining power dynamics between two soccer teams, we can define multiple degrees of victory, such as the likelihood of one team winning by one goal versus two or more goals, or the probability of a draw. Each of these components can be described with its own T, I, F values, leading to a more precise, multidimensional model of the social event.

Neutrosophic Social Systems

Neutrosophic sociology views social systems as dynamic, open, and continuously evolving. In contrast to traditional sociological models, which often focus on static representations of society, neutrosophic sociology acknowledges that social systems fluctuate between states of order and disorder. These fluctuations are influenced by various hidden and observable parameters, such as cultural shifts, economic pressures, and political movements.

Social systems are never perfectly stable; they constantly oscillate between periods of apparent stability and moments of instability. For example, the rise and fall of political ideologies, the changing roles of families, or the fluctuating nature of social movements can all be modeled as transitions between ordered and disordered states.

Neutrosophic sociology enables us to capture these transitions by considering the degrees of order, disorder, and indeterminacy within each system.

Sociological Forecasting and Social Change

One of the most compelling applications of neutrosophic sociology is its potential for sociological forecasting. Using neutrosophic probability, we can predict the likelihood of future social events, such as revolutions, wars, or changes in family structures. Neutrosophic statistics offer the potential to identify patterns of social change, helping policymakers, social scientists, and futurists make more informed decisions about how societies may evolve.

For example, the future of family structures remains a critical issue for sociologists. Will the traditional family model endure, or will alternative forms of family life, such as polyamory, single-parent families, or other structures, become more prevalent? Neutrosophic probability allows us to model the likelihood of these outcomes, each with its own degree of truth, indeterminacy, and falsehood.

Neutrosophic Social Norms and Rules

Social norms and rules in any society are shaped by varying degrees of truth, falsehood, and indeterminacy. What one group considers morally acceptable, another may view as morally wrong, while yet another may remain uncertain about the issue. Neutrosophic sociology takes this complexity into account by representing social norms as (T, I, F)-rules, which reflect the partial truth and indeterminacy inherent in societal values.

For instance, certain cultural practices, such as polygamy or capital punishment, may be viewed as morally acceptable in some societies but as unethical in others. Neutrosophic sociology recognizes that these norms are not absolute but are subject to change and reinterpretation based on cultural, historical, and individual perspectives.

The Many Truths and Falsehoods in Social Life

A core principle of neutrosophic sociology is the recognition that multiple truths and falsehoods exist in social life. Different individuals and groups perceive social facts in different ways, often influenced by personal, cultural, or ideological biases. As such, social facts are rarely absolute; they are frequently interpreted through the lens of individual and collective experience.

Neutrosophic sociology encourages us to embrace this diversity of perspectives, acknowledging that no single interpretation of a social fact is universally “right” for all people.

This approach fosters a deeper understanding of the complexity of social interactions and the multiple interpretations that arise in diverse social contexts.

Toward a Neutrosophic Framework for Modeling Social Change and Complexity

Neutrosophic sociology offers a powerful tool for understanding the complexities and contradictions of social life. By integrating the principles of neutrosophy—degrees of truth, indeterminacy, and falsehood—into sociological analysis, we can more accurately represent the fluid and dynamic nature of society. As we continue to confront the uncertainties and complexities of social phenomena, neutrosophic sociology holds the promise of becoming an invaluable resource for both theoretical inquiry and practical decision-making.

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Neutrosophic Social Evolution

Degrees of Evolution, Indeterminacy, and Involution

The idea of social evolution has been a core component of sociological thought for centuries, influencing our understanding of societal development, transformation, and the factors that drive social change. Traditional approaches, such as those proposed by Talcott Parsons and Herbert Spencer, emphasize linear processes of development and improvement in society. However, these perspectives often fail to capture the complexity and ambiguity inherent in modern social dynamics.

Neutrosophic Sociology, Neutrosophic Probability, Indeterminacy, Neutrosophic Social Systems, Neutrosophic Social Evolution, Social Phenomena, Social Change, Sociological Forecasting, Social Norms, Sociological Triads, Social Complexity, Social Data, Dynamic Social Systems.

Neutrosophic Social Evolution,¹ as a refinement of these earlier theories, introduces a more nuanced framework that incorporates the roles of evolution, involution, and indeterminacy in the ongoing development of societies. This approach recognizes that social change is not merely a progression toward an ideal state but involves a dynamic interplay of multiple forces, leading to varied outcomes depending on the parameters being considered.

¹ Florentin Smarandache (2017): "Introducing a Theory of Neutrosophic Evolution: Degrees of Evolution, Indeterminacy, and Involution." *Progress in Physics*, Volume 13, Issue 2 (April), 130-135.

Extending the Process of Evolution: The Dialectic vs. Neutrosophic Approach

At the heart of traditional dialectical models of social change, such as Marxist theory,² is the understanding that social evolution unfolds through the interaction of opposites—typically framed as thesis and antithesis—that resolve into a synthesis.³ This dialectic implies a clear and linear progression: societal structures evolve through conflict and contradiction, gradually advancing toward a new, more developed state. For example, in Marxism, the transition from feudalism to capitalism, and later from capitalism to socialism, is seen as a natural evolutionary trajectory driven by inherent contradictions in the system.

In contrast, Neutrosophy introduces a more complex understanding of evolution. Rather than focusing solely on the binary opposition between $[A]$ (thesis) and $[\text{anti}A]$ (antithesis), Neutrosophic Evolution proposes a broader process of development, characterized by degrees of evolution, involution, and indeterminacy—each of which can influence societal change depending on the parameters under consideration.

Degree of Evolution

This refers to the extent to which a society progresses or transforms in a positive direction with respect to certain social parameters (such as economic growth, technological advancement, or political stability).

Degree of Involution

This represents the potential regression or deterioration of certain aspects of society, where certain social parameters (such as cultural values, environmental sustainability, or public health) may decline or experience setbacks.

Degree of Indeterminacy

This indicates areas where change is neither clearly progressive nor regressive. These ambiguous spaces reflect social parameters that remain neutral or unclear in their evolution, remaining unchanged or in a state of flux without a clear direction.

² Wilterdink, Nico and Form, William. "social change". *Encyclopedia Britannica*, 16 Dec. 2024, <https://www.britannica.com/topic/social-change>. Accessed 10 February 2025.

³ Maybee, Julie E., "Hegel's Dialectics", *The Stanford Encyclopedia of Philosophy* (Winter 2020 Edition), Edward N. Zalta (ed.), <https://plato.stanford.edu/archives/win2020/entries/hegel-dialectics>. Accessed 10 February 2025.

Thus, Neutrosophic Social Evolution moves beyond the simplistic linearity of traditional evolution, offering a framework that acknowledges the multifaceted nature of social change and the presence of neutral or indeterminate states that complicate our understanding of progress.

Neutrosophic Social Evolution: Theory and Application

Talcott Parsons⁴ proposed the idea of social evolution, focusing on the adaptation and functional integration of social systems. Parsons believed that societies evolve by adapting to new challenges, increasing in complexity, and moving toward greater social order. However, this view has been critiqued for overemphasizing the positive aspects of social evolution and neglecting the presence of social problems that persist or even worsen over time. C. Wright Mills⁵ criticized the idea of “the survival of the fittest societies,” emphasizing the persistence of social inequalities and issues such as poverty, oppression, and conflict, which seem to resist resolution.⁶

Building upon these critiques, Neutrosophic Social Evolution introduces a more nuanced perspective that acknowledges both the potential for positive transformation and the reality of persistent problems in society. This framework suggests that social change does not simply result in continuous improvement, as Parsons have envisioned, but rather involves a combination of evolutionary advancements, involutionary regressions, and indeterminate states.

In practice, Neutrosophic Social Evolution requires that we consider a multitude of social parameters—economic, technological, cultural, political, and environmental—that interact in complex ways. These parameters evolve at different rates and in different directions. For instance, while a society may experience technological advancements, such as the development of the internet or mobile devices, these advancements may simultaneously create new forms of social problems, such as cybercrime, online bullying, or privacy concerns.

Thus, social change is not purely positive; it involves a complex balancing act between progress, regression, and uncertainty.

⁴ Britannica, The Editors of Encyclopaedia. “Talcott Parsons”. *Encyclopedia Britannica*, 9 Dec. 2024, <https://www.britannica.com/biography/Talcott-Parsons>. Accessed 10 February 2025.

⁵ Britannica, The Editors of Encyclopaedia. “C. Wright Mills”. *Encyclopedia Britannica*, 24 Aug. 2024, <https://www.britannica.com/biography/C-Wright-Mills>. Accessed 10 February 2025.

⁶ John D Brewer (2004). “Imagining *The Sociological Imagination*: The Biographical Context of a Sociological Classic,” *British Journal of Sociology* 55:3, 319–333.

The Impact of Technology on Social Evolution: A Neutrosophic Perspective

One of the clearest examples of Neutrosophic Social Evolution can be seen in the role that technology plays in shaping contemporary society. The advent of the internet and mobile technology has transformed communication, commerce, education, and social interaction in ways that could not have been anticipated a few decades ago. These changes demonstrate the multi-dimensional nature of social evolution, where progress in one area can simultaneously lead to challenges in another.

Social Evolution

Technology has facilitated faster and more efficient communication, making it easier for people to connect across vast distances. Innovations like distance education (e-learning), e-commerce, and telecommuting have transformed how we work and learn, creating new opportunities for economic participation and access to information. The internet has also made it possible to form new types of social networks and communities, bringing people together based on shared interests and goals, regardless of geographic location.

Social Involution

However, the rapid proliferation of technology has also led to unintended negative consequences. The erosion of privacy, due to widespread surveillance and data collection, has become a major social issue. Cybercrimes, such as identity theft, online fraud, and hacking, have created new challenges for individuals and governments alike. Additionally, the over-reliance on mobile devices and the internet has been linked to social isolation, mental health issues, and addiction, particularly among younger populations. Technology, while enabling greater social interaction in some respects, has also contributed to the breakdown of traditional forms of community and social cohesion.

Indeterminacy (Neutral or Unchanged Aspects)

Despite the many changes brought about by technology, some aspects of human life remain unchanged. People still form friendships, experience conflicts, and seek meaning and purpose in their lives. Technology has not fundamentally altered the nature of human relationships or the basic patterns of social interaction—people still engage in leisure activities, vacation, work, and play in largely similar ways, even if these activities are increasingly mediated by digital technologies.

This illustrates the Neutrosophic nature of social change, where technology simultaneously drives evolution, involution, and indeterminacy across different dimensions of society. The society's relationship with technology is far from straightforward; it is marked by progress in some areas, regression in others, and neutrality or ambiguity in yet others.

Refined Neutrosophic Evolution

To better capture the complexity of social evolution, Neutrosophic Social Evolution introduces the concept of Refined Neutrosophic Evolution, which further elaborates on the degrees of evolution, involution, and indeterminacy that can manifest in any given society. This refined model introduces multiple levels of analysis for each social parameter, allowing for a more granular understanding of social change.

For example, a social change may lead to varying degrees of evolution (T_1, T_2, T_3, \dots) in one set of social parameters, while resulting in degrees of involution (F_1, F_2, F_3, \dots) in another. In some areas, changes may remain neutral (I_1, I_2, I_3, \dots), reflecting no significant transformation in the *status quo*, while in others, the outcome may be uncertain or unclear ($I(n+1), I(n+2), \dots$), reflecting the indeterminate nature of social forces.

This refined approach allows us to better understand the multiplicity of factors at play in any social change, moving beyond simplistic dichotomies of progress vs. regression.

Toward a Neutrosophic Framework for Social Evolution and Change

Neutrosophic Social Evolution offers a sophisticated and nuanced framework for understanding the dynamics of societal change. By incorporating degrees of evolution, involution, and indeterminacy, this approach accounts for the complexity and unpredictability of social processes. It recognizes that social change is rarely a straightforward, linear progression toward an ideal state; instead, it is marked by conflicting&balancing forces that drive society forward, backward, and sometimes leave it in an ambiguous, neutral space.

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Neutrosophic Materialism: An Extension of Dialectical Materialism

Materialism, as a philosophical outlook, has undergone several evolutionary transformations from classical metaphysical materialism to the more dynamic and socially-conscious dialectical materialism proposed by Marx.

Neutrosophic Materialism, Dialectical Materialism, Neutrosophy, Hegelian Dialectics, Marxism, Neutrosophic Society, Social Change, Historical Materialism, Neutral Forces, Capitalism, Communism, Material Conditions, Social Forces, Social Evolution, Social Dynamics, Economic Systems, Hybrid Systems, Socialism, Political Change, Class Conflict.

In this short essay, I propose the concept of Neutrosophic Materialism, which extends and refines *dialectical materialism*. Neutrosophic Materialism offers a broader, more nuanced framework for understanding the material conditions, social forces, and ideas in shaping human history and social reality.

At the heart of dialectical materialism is the dialectic—a process where a *thesis* gives rise to its *antithesis*, and their inherent contradictions are reconciled in a *synthesis*.

This process was articulated by Hegel and later appropriated by Marx to explain the development of material conditions and social structures.

In Hegelian dialectics, the thesis and antithesis are opposites, and their conflict leads to a higher resolution, or synthesis, which represents an advancement in understanding or societal organization.

A Conceptual Evolution

Neutrosophic philosophy builds upon this Hegelian dialectical structure by introducing a fourth element: the **neutrothesis**. This neutrothesis represents the neutral or indeterminate middle ground between opposites, bridging the gap between the thesis and its antithesis. In this way, Neutrosophy allows for a deeper exploration of the contradictions in society, offering not just a synthesis but a richer, more inclusive resolution. Thus, Neutrosophic Materialism can be seen as an extension of dialectical materialism—one that incorporates the neutrality and indeterminacy that exists between opposing forces in society.

For example, in the dialectical process, $[A]$ (thesis) and $[\text{anti}A]$ (antithesis) are polar opposites, and their conflict is traditionally resolved through synthesis. In Neutrosophy, the neutrality or indeterminacy between these opposites—represented as $[\text{neut}A]$ —contributes to the resolution, either enhancing one side, the other, or both. Moreover, in refined neutrosophy, the neutral forces are not static but can be varied and multiple, thus enabling more complex, dynamic models of social phenomena.

Neutrosophic Upgrades to Engels' Dialectics

Engels' formulation of dialectics, grounded in materialism, has been instrumental in shaping Marxist philosophy. Neutrosophic Materialism further develops Engels' dialectics in the following ways:

The First Law: Unity and Conflict of Opposites and Their Neutrals

Engels' first law, which asserts the unity and conflict of opposites, is extended to include the role of neutrals. Neutrosophic Materialism suggests that opposites do not merely conflict but are also shaped and influenced by neutrals that intervene in one way or another.

These neutrals are not passive but actively contribute to resolving contradictions in one direction or another.

The Second Law: Quantitative and Qualitative Changes

While Engels' second law suggests that quantitative changes eventually lead to qualitative transformations, Neutrosophic Materialism introduces the idea that these changes can occur both gradually and spontaneously. Quantitative changes—such as an increase in wealth or technological development—often lead to routine or incremental shifts.

However, qualitative changes, which may seem radical, can also occur suddenly, without a gradual build-up.

The Third Law: Negation of the Negation

The third law of dialectics, the negation of the negation, suggests that societal transformations occur through a process of negation. For Marx, this meant the negation of feudalism through capitalism, and then the negation of capitalism through communism. In Neutrosophic Materialism, however, we recognize the possibility of a third negation—the reversal of communism back into capitalism, as seen in countries like China, Russia, and Vietnam, where formerly communist economies have adopted capitalist elements.

This highlights the cyclical, and at times contradictory, nature of social change, where systems once thought to be overthrown can resurface in a modified form.

Neutrosophic Society: A Blend of Capitalism and Communism

The concept of **Neutrosophic Society** arises from the recognition that there is no pure capitalist or communist society in the modern world. Instead, societies are characterized by varying degrees of capitalist and communist elements, resulting in hybrid systems that blend opposites. Marx predicted that communism would emerge from the contradictions of capitalism, but the reality of the 21st century has shown that capitalism has, in some ways, emerged within formerly communist states.

China and Russia, for example, transitioned from centrally planned economies to hybrid systems that incorporate elements of capitalism while maintaining a nominally communist political framework. This shift demonstrates the evolution of a Neutrosophic Society—as a society that integrates both capitalist and communist features. Similarly, in capitalist countries like France, Germany, and the Nordic nations, socialism has manifested through extensive social programs, such as universal healthcare and education, welfare systems, and retirement programs, blending capitalist economic systems with socialist social policies.

Neutrosophic Society, therefore, does not exist as a binary, but rather as a spectrum where capitalist and communist elements coexist in varying degrees. In this context, society is not defined solely by either capitalism [A] or communism [antiA], but by a dynamic interplay of both, alongside their neutralizing elements.

Classical Materialism vs. Neutrosophic Materialism

Classical materialism, particularly in the Marxist tradition, emphasizes the primacy of material conditions in shaping society. This materialism is inherently dialectical, focusing on the interrelations of opposites—such as the conflict between capital and labor. In contrast to *Classical Metaphysical Materialism*, which treats the material world as static and disconnected, *Dialectical Materialism* embraces the dynamic and interconnected nature of material conditions.

Neutrosophic Materialism builds on this by incorporating the indeterminacies and neutralities that exist within material and ideological systems. Instead of merely focusing on the binary opposition between materialism and idealism, Neutrosophic Materialism recognizes that material environments—be they economic systems, societal structures, or ideological constructs—are influenced not only by the interaction of opposites but also by the presence of neutral forces.

These neutral forces can take different forms, influencing the trajectory of social, economic, and political change.

Neutrosophic Materialism accounts for dynamicity, connectivity, and evolution in material environments, while also recognizing that neutrality plays a significant role in shaping the course of history. Societies evolve and change not through a simplistic oscillation between opposites, but through the interplay of opposites and their neutralizing forces.

Neutrosophic Historical Materialism

Marx's Historical Materialism posits that the material conditions of society—especially its mode of production—determine the structure and development of social and political institutions. *Neutrosophic Historical Materialism* extends this concept by suggesting that history is not shaped solely by material forces or ideas, but by the interplay of material conditions, ideological forces, and the neutral forces that mediate between them.

History, in this view, is shaped by a dynamic balance of material, phenomenal, and ideological forces, each contributing to the unfolding of historical events. As opposed to Marx's emphasis on class conflict as the primary engine of historical change, Neutrosophic Historical Materialism recognizes that social dynamics are more complex, involving not just *conflict*, but also *cooperation* and *neutrality* (e.g., ignorance).

In this expanded framework, the influence of weather, geography, political systems, and cultural factors all play a role in shaping the historical materialism of a given society.

Neutrosophic Materialism also acknowledges the intersection of materialism with ideology, where social change occurs through a complex interplay of material conditions, ideas, and the neutral spaces in between.

Toward Rethinking Social Systems and Historical Change

Neutrosophic Materialism provides a more expansive and flexible framework for understanding the complexities of social systems and historical change. By incorporating the principles of Neutrosophy—dynamicity, connectivity, evolution, and neutrality—into materialist thought, Neutrosophic Materialism allows us to better grasp the multi-dimensional nature of social reality, suggesting that social change is not just the result of opposing forces clashing but also the outcome of the interplay between opposites, their neutralizers, and the ever-evolving material conditions of life.

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The Principle of Partial Locality, Partial Indeterminacy, and Partial NonLocality

This article¹ introduces a new neutrosophic principle aiming to extend and generalize the concepts of locality and nonlocality by addressing scenarios involving indeterminacy and partialities. Locality refers to interactions or processes confined within a limited region of space or time. But there may be a Total (100%) Locality, or a Partial Locality (less than 100% and greater than 0%). The effects are constrained to the immediate environment. Contrariwise, NonLocality refers to interactions or connections between entities separated by space or time. The changes in one location have instantaneous effects on another. Similarly, there may be a Total (100%) NonLocality, or a Partial NonLocality (less than 100% and greater than 0%). Total (100%) or Partial (less than 100% and greater than 0%) Indeterminacy may arise from hidden variables and from environment. For instance, it may involve nonlocal connections between objects that are only partially entangled or influence each other in limited ways, rather than exhibiting complete freedom.

Locality, Indeterminacy, Nonlocality, MultiLocality, MultiIndeterminacy, MultiNonLocality, MultiAction At A Distance, Universal Gravitation, Superposition, Quantum Physics, Quantum Information, Bell Inequality, Hidden Variables, Cell (In Biology), Paracrine, CPU Caches, Latent Dirichlet Allocation, Curling, Pollination, Trophic Cascade.

The Principle of Partial Locality, Partial Indeterminacy, and Partial NonLocality implies an interplay of locality, indeterminacy, and nonlocality acting in a dynamic neutrosophic system. A generalization of (Locality, Indeterminacy, NonLocality) is the (MultiLocality, MultiIndeterminacy, MultiNonLocality).

Practical examples from different fields are provided.

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Preliminary Remarks

Let's start by briefly discuss—with simple, quasi-random examples—the concepts of locality and non-locality, and then explain and illustrate some theoretical hidden variables parameters in scientific models.

In ecosystems, the interactions within and between ecosystems can show both local and nonlocal characteristics. Migratory species travel sometimes vast distances² between different ecosystems, yet their migration patterns connect those distant ecosystems, meaning their presence and behaviors have nonlocal effects and exert widespread consequences on food webs, predator-prey relationships, or nutrient cycling across regions, whilst daily interactions within a specific local habitat, such as feeding, mating, and nesting behaviors, are local.³ Keystone species⁴ have disproportionate effects on their ecosystems relative to their abundance.⁵ This type of nonlocal effects (known as the ‘trophic cascade’⁶) illustrate how changes in one species can ripple throughout the ecosystem, shaping environmental conditions and affecting other species that are far removed from the original source of change.

² In Tanzania's Serengeti region, plains animals, especially wildebeests (*Connochaetes taurinus*) and zebras, migrate over 1,600 kilometers (1,000 miles) seasonally [Dorst 2024].

³ Such as the herds of caribou (*Rangifer tarandus*) that settle during the summer in the barrens, which are relatively flat wastelands with sparse vegetation, while, in July, they begin an irregular southward migration, and they spend the winter in the taiga, where each herd moves according to local conditions, lacking a well-defined pattern [Dorst 2024].

⁴ Elephants (*genus Loxodonta*), for example, are considered as “ecosystem engineers” because they modify their environment by dispersing seeds, uprooting trees, or creating water holes, stimulating “plant richness to peak (...), setting up a creative browsing-grazing tension and a patchwork of habitats” [Western et al. 2021].

⁵ The reintroduction of gray wolves (*Canis lupus*) in Yellowstone National Park in 1995/1996 after a 70-year absence has led to cascading effects on the entire ecosystem, including the recovery of aspen trees, which provide habitats for birds and other species. Wolves are apex predators that hunt large herbivores like elk. By reducing elk populations, overgrazing is prevented, and vegetation is allowed to recover [Ripple et al. 2012; Farquhar 2023].

⁶ American zoologist Robert Paine coined the term in 1980's to describe changes in food webs caused by manipulations of predators. Others employed the term to describe changes in aquatic ecosystems arising from factors such as sudden increases or dramatic declines in predatory fishes, caused, e.g., by overfishing [Carpenter 2023].

The effects of a collision between two objects are local to the region of contact. When two curling⁷ stones⁸ collide, the forces exerted and the resulting changes in motion are confined to the immediate area where they touch. Velocity and direction, as any other interactions and resulting effects, are purely local to the point of impact.⁹

The production of car parts in a local factory involves local labor, resources, and economic interactions. The final assembly of a car often involves sourcing parts from various countries. Disruptions in one part of the supply chain (e.g., a factory shutdown in one country) can have significant nonlocal effects, impacting production schedules and economic conditions in other parts of the world.¹⁰

Hidden variables are theoretical parameters or entities in scientific models that are not directly observable but are postulated to exist in order to explain certain phenomena [Kochen et al. 1975].

*Bohmian mechanics*¹¹ offers an interpretation of quantum mechanics by introducing hidden variables to translate quantum phenomena “in an objective way using deterministic dynamics” [Dabin 2009, 40], unlike the standard inherently probabilistic Copenhagen interpretation. According to

⁷ Curling is an ice-played game akin to lawn bowls, where two teams – each consisting of four players – compete, sliding round stones across the ice toward a target (button). The stones are concave at the bottom and have a handle on top. The button is located at the center of a circle marked with concentric rings (house). The aim of the game is for each team to position their stones as close to the center as possible. For more info on this game, see Britannica – The Editors of Encyclopedia. “curling”. Encyclopedia Britannica, 11 Apr. 2024, <https://www.britannica.com/sports/curling>. Accessed 26 June 2024.

⁸ Curling regulations specify that a curling stone can weigh up to 20 kilograms, with most stones typically weighing between 17 and 20 kg. Additionally, the maximum permissible circumference of a stone is 36 inches (910 mm), while the minimum height is 4.5 inches (110 mm). The substantial weight allows the stone to glide the length of the rink without slowing down too soon.

⁹ The curl distance for a curling stone, given a typical angular velocity (four rotations over 28.35 meters in 23 seconds, equivalent to 1.09 rad/s or 62.6°/s), ranges from approximately 0.5 to 1.5 meters when aimed at a circular target 28.35 meters away on ice. Various factors influence these curl distances, including the ice surface conditions (such as temperature, pebble density, and the size and shape of the pebbles) and the characteristics of the curling stones themselves. [Kameda et al. 2020]

¹⁰ In recent decades, economic globalization has led to a substantial shift of manufacturing to regions with lower perceived costs, notably moving production to China and other Asian countries. Although this approach initially seemed economically sensible, its significant downsides have become apparent in the past three years. Consequently, many industries, especially the automotive sector, are now embracing a “local for local” production strategy, particularly with the shift towards electric vehicles. [Abuelsamid 2022]

¹¹ Also known as the de Broglie-Bohm theory, proposed by Louis de Broglie in 1927 and reshaped by David Bohm in 1952.

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this theory, particles possess definite positions at all times even when unobserved. These positions are hidden variables guided by a “pilot wave” [Goldstein 2024]. Valentini has expanded this theory to incorporate signal nonlocality, enabling entanglement to function as an independent communication channel, and thus eliminating the need for a secondary classical “key” signal to “unlock” the message encoded in the entanglement [Valentini 1991, 2009].

Two concepts proposed in cosmology to explain observable phenomena such as galaxies’ rotation curves and the universe’s rapid expansion, and deduced from gravitational effects on visible stuff and the universe’s large-scale structure, are *dark matter* and *dark energy*.¹² They are also hidden variables. The observable universe consists of *matter*, which occupies only 5% of the cosmos. The remaining 95% is made up of *dark matter* (27%) and *dark energy* (68%), mysterious substances still under investigation by scientists.¹³ Normal matter, composed of protons, neutrons, and electrons, can be seen directly or through telescopes. Dark matter, however, does not interact with light, making it invisible.

Latent variables are employed to model topics in machine learning. Latent Dirichlet Allocation (LDA) is a three-level hierarchical Bayesian model that identifies hidden subjects in a set of documents. It depicts each item in a collection as a finite mixture over a set of topics, and each topic as an infinite mixture over a set of topic probabilities [Blei et al. 2003].

In the construction of measurement models for psychological data (psychometrics), *latent traits* —describing veiled psychological abilities or skills like motivation, or anxiety, so on— are hidden variables, being not immediately quantifiable, but only inferred from outcomes of genetic profiles and psychological tests. [Hambleton&Cook 1977, 75].

¹² The concepts were proposed in the 20th century by Fritz Zwicky, and confirmed by Vera Rubin in the 1970s.

¹³ Percentages estimated by the European Space Agency (ESA), https://www.esa.int/Science_Exploration/Space_Science/What_are_dark_matter_and_dark_energy. Dark matter and dark energy stories are updated continuously on United States National Aeronautics and Space Administration (NASA) website, <https://science.nasa.gov/universe/dark-matter-dark-energy/>.

Certain *genetic mutations* (alterations) —that are not readily visible, but can be found by genetic testing— raise the risk of an individual of developing cancer or other serious health issues.¹⁴

In the study of *infectious diseases*, *asymptomatic carriers* are individuals who harbor a pathogen without showing symptoms and can transmit the disease to others. The presence of these carriers is a hidden variable in epidemiological models.¹⁵

The Principles of Locality, NonLocality, and Neutrosophic Locality

The Principle of Locality

The **Principle of Locality** means that an object is influenced directly only by its immediate surroundings. Let's briefly review a few cases.

Computer Science: CPU Cache

In computer architecture, locality is a key principle in the design of memory hierarchies. For example, if a particular memory location is accessed, it is likely to be accessed again in the near future (this is called *temporal locality*). Also, if a particular memory location is accessed, nearby memory locations are likely to be accessed soon (and this is called *spatial locality*). CPU caches¹⁶ exploit these principles by locally storing frequently accessed data, close to the processor, to minimize access time and improve performance.

Biology: Cellular Processes

Cell signaling often operates on a local level. For example, paracrine¹⁷ signaling involves the release of signaling molecules (like growth factors.) from one cell that affect nearby target cells. These molecules typically do not travel far from their point of release. Their effects are localized to the immediate cellular environment.

¹⁴ See, for example, a case study about risks and mechanisms of cancer in women with inherited susceptibility to epithelial ovarian cancer [Shulman 2011].

¹⁵ See, for example, a case study about Coronaviruses SARS-CoV, MERS-CoV, and SARS-CoV-2 in asymptomatic pediatric population [Aleebrahim-Dehkordi et al. 2021].

¹⁶ A short but comprehensive introduction in CPU Cache offers *Britannica* – The Editors of Encyclopaedia. “cache memory”. Encyclopedia Britannica, 20 May. 2021, <https://www.britannica.com/technology/cache-memory>. Accessed 23 June 2024.

¹⁷ More on the paracrine control can be read on *Britannica* – Utiger, Robert D. “human endocrine system”. Encyclopedia Britannica, 17 Apr. 2019, <https://www.britannica.com/science/human-endocrine-system>. Accessed 24 June 2024.

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Ecology: Habitat Interactions

In many ecosystems, pollination¹⁸ is a local process. Bees, butterflies, and other pollinators typically collect and transfer pollen within a specific area. The interactions between plants and their pollinators occur in close proximity, and the effects¹⁹ are localized to that region [Kevan 2001; 2020].

Medicine: Local Anesthesia

Local anesthetics are used to numb a part of the body during minor surgical procedures. When a local anesthetic is administered, its effects are confined to the targeted area, blocking nerve signals and preventing pain in that specific region while the patient remains unaffected elsewhere.

Chemistry: Chemical Reactions

In a simple acid-base neutralization reaction,²⁰ the interactions and resultant effects (like the formation of water and salt) occur at the molecular level in the immediate vicinity where the reactants come into contact. The reaction is localized to the solution where the chemicals are mixed.

Sociology: Community Dynamics

Neighborhood Watch Programs²¹ are examples of local initiatives where community members collaborate to monitor and improve safety within their immediate area. The actions and effects²² of these programs are confined to the neighborhood level.

Economics: Local Markets

Farmers' markets operate on a local scale, involving transactions between local farmers and consumers. The economic activities are confined to a specific geographic area, and the effects (exchange of goods, pricing, and consumer satisfaction) are localized to the community where the market takes place.

¹⁸ A basic but extended entry about pollination can be read here: The Editors of Scholarly Community Encyclopedia "Efficient Pollination Technology of Crops", <https://encyclopedia.pub/entry/40852>. Accessed 20 June 2024.

¹⁹ Successful pollination and subsequent seed production.

²⁰ Such as mixing hydrochloric acid (HCl) with sodium hydroxide (NaOH).

²¹ Read more about the US program and statistics of crime prevention through neighborhood collaboration on the National Neighborhood Watch (a Division of the National Sheriffs' Association) website: <https://www.nnw.org>.

²² These would be reducing crime rates and increasing community cohesion.

The Principle of Non-Locality

The Principle of Non-Locality (Instantaneity), or *Action at a Distance*, means that an object is influenced by another object without being in physical contact (e.g., gravity, Coulomb's Law, Electric Forces, and so on).

Physics: Quantum Entanglement

In quantum mechanics, entangled particles exhibit nonlocal behavior. When two particles become entangled, the state of one particle is directly related to the state of the other, regardless of the distance separating them. If you measure the spin of one entangled particle, the spin of the other particle is instantly known, even if they are light-years apart. This phenomenon has been experimentally confirmed and is a cornerstone of quantum mechanics, defying classical intuition.²³

Classical Physics: Gravitational and Electromagnetic Forces (pre-relativity)

Gravitational and electromagnetic forces were thought to operate at a distance instantaneously prior to the postulation of relativity. Two masses exert an attractive force on one other regardless of distance, with no apparent intermediate impact, according to Newton's law of universal gravitation.²⁴ Equally, Coulomb's inverse-square law²⁵ is an experimental physical law that determines the amount of force between two electrically charged particles at rest.

Computer Science: Blockchain Technology

The verification and recording of transactions in blockchain systems demonstrates nonlocal interactions. Many nodes must validate a transaction that is broadcasted to the network. The consensus process²⁶ ensures that all nodes agree on the blockchain's current state. Proving nonlocality, the addition of a new block or other changes to the blockchain are immediately returned throughout the network.

²³ See, for example, a paper on the exploration of the relationship between quantum nonlocality and entanglement [Cao et al. 2023], or on quantum entanglement without nonlocal causation [Pettini 2023].

²⁴ Britannica, The Editors of Encyclopaedia. "Newton's law of gravitation". Encyclopedia Britannica, 12 Apr. 2024, <https://www.britannica.com/science/Newton's-law-of-gravitation>. Accessed 2 August 2024.

²⁵ Britannica, The Editors of Encyclopaedia. "Coulomb's law". Encyclopedia Britannica, 25 Jul. 2024, <https://www.britannica.com/science/Coulombs-law>. Accessed 2 August 2024.

²⁶ Such as *Proof of Work* or *Proof of Stake*, used to verify new cryptocurrency transactions [Napoletano 2023].

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Genetics: Epigenetic Modifications

Epigenetic changes²⁷ can have nonlocal effects across generations. Environmental factors like diet, stress, and exposure to toxins can cause epigenetic modifications that do not change the DNA sequence but affect gene expression. These changes can be passed down to offspring, influencing their development and health.

Ecology: Ecosystem Dynamics

Migrations of a vast numbers of individuals from diverse taxa occur worldwide. It plays a crucial role in transporting nutrients, and other organisms, as they forage and are preyed upon. The movement of migrating species across extensive spatial scales influences the ecosystems through which these animals travel. Hidden variables include the genetic traits or physiological states of migratory species that determine their migration patterns and behavior. [Cohen et al. 2020], [Bauer et al. 2014], [Garcia et al. 2024]

Principle of Partial Locality, Partial Indeterminacy (because of the hidden variables that may influence the object), and Partial Non-Locality

I propose for the first time the Principle of Partial Locality, Partial Indeterminacy (because of the hidden variables that may influence the object), and Partial Non-Locality, which I call the Principle of Neutrosophic Locality.

The Aharonov-Bohm effect, which is a quantum mechanic phenomen, proved that: an electrically charged particle is affected by an electromagnetic potential that is totally outside of the particle (the particle being situated in a region where the intensity of the magnetic field is zero).

This Non-Locality event, first observed by the Soviets, was later on investigated by other secret services in order to control the Human Psyche from a distance.

The Action at a Distance may be:

- i) Continuous action;
- ii) Quantized action, or action by quantas, which are small subdivisions of physical processes and phenomena of a particular system.

I may call it infinitdecimally discrete action.

²⁷ Such as DNA methylation [Moore 2013].

Degree of Locality, Degree of NonLocality, and Degree of Indeterminacy (neither Locality, nor NonLocality)

Degree of Locality

Locality means that an object is directly influenced only by its immediate surroundings.

The Degree of Locality measures the degree to which a system or interaction follows this principle. A high degree of locality indicates that there is little to no effect from far-off particles or events, meaning that the interactions are very limited.

Degree of NonLocality

The phenomenon known as NonLocality describes the ability of particles that are distant in space to instantly display linked actions by a Degree of NonLocality in the system. Strong correlations between far-off particles or systems indicate a high degree of nonlocality.

Degree of Indeterminacy (neither Locality nor NonLocality)

There are situations when uncertainty or lack of definitive behavior falter in terms of locality and nonlocality, therefore the system does not exhibit clear characteristics of either local or nonlocal interactions.

The Degree of Indeterminacy quantifies the degree to which the behavior of a system defies simple classification as exclusively local or completely nonlocal.

When a system displays behaviors that are unclear, inconsistent, or that don't easily fit into the categories of locality or nonlocality, it is said to have a high degree of indeterminacy.

Measuring These Degrees

To quantify these degrees in practice, one typically relies on experimental setups that test the correlations between particles or systems, such as:

- *Bell Inequality Test* is a “real-world physics experiment designed to test the theory of quantum mechanics” against the concept of local realism²⁸

²⁸ See *Scholarly Community Encyclopedia*, “Bell Test Experiments.”. Available online: <https://encyclopedia.pub/entry/36569> (accessed on 02 August 2024).

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- *Theories of Local Hidden Variables* aim “to attribute ‘hidden’ definite outcomes to any potential measurement on a quantum system” [Bertlman 2023]
- *Neutrosophic Statistical Analysis* [Smarandache 2013] evaluates indeterminacy by analyzing the variance and distribution of measurement outcomes to see if they defy categorization into local or nonlocal.

Recapitulation, generalization, and applications

Quantum Non-Locality states that a quantum particle instantaneously knows the state of – and correlates the behavior with – other quantum particle.

Quantum Entanglement asserts that two entangled particles correlate their behaviors simultaneously (therefore faster than light), as such our faster-than-light speed hypothesis has been confirmed.

John Clauser, an American physicist, in 1970’s, and Alain Aspect, a French physicist, in 1980’s, has proved that the entanglement is real, and, as a consequence, the superluminal speed is real.

Faraday said that some medium transmits the electrical force (not action at a distance).

Quantum Teleportation is the transfer from sender to receiver of quantum information, whose basic unit is the qubit.

The Copenhagen Interpretation of “wave-particle duality” that “the electron travels as a wave and is detected as a particle”, and “an electron is in more places at the same time” are popular (mis)interpretations.

The behavior of a particle is described by a wave fluctuation (Ψ) that has the shape of an equation.

The wave-particle duality is actually the indeterminate part of the neutrosophic form of the electron, because it fluctuates between – or is a superposition of – the opposites (wave vs. particle).

Locality (or Local Causality) was named by Bell; others called it later local realism.

Bell’s Inequality: In Quantum Mechanics, when electrons are sent across the magnetic field, half of the electrons get deflected towards to the right, and the other held to the left.

Violation of Bell’s Inequality: In Experiments the predictions of local realistic models disagree with those of quantum mechanics.

Realism means the assumption that measurement outcomes are well-defined prior to and independent of the measurements.

I now introduce for the first time Partial Locality Causality, Partial NonLocal Causality, and Partial Indeterminate Causality.

*

Partial Locality means that an object is influenced only partially by its immediate surroundings.

Similarly, Partial NonLocality means that an object is only partially influenced by another object without being in physical contact.

Partial Indeterminacy means that it is not clear that an object is influenced either by its immediate surroundings, or by another object without being in physical contact, or by both.

Such behavior is exhibited by an ambiguous, vague, incomplete, or inconsistent system.

*

Quantum Physics defy the Classical Physics, because the behavior of erratic atomic and subatomic particle.

The degrees of locality, nonlocality, and indeterminacy may be measured for each system, upon the interactions between touching objects (Locality), non-touching objects (NonLocality), and the influence of hidden variables (Indeterminacy) on these interferences.

Quantum Physics: The correlation between particles can be tested by experiments. At the quantum level, the degree of NonLocality may be measured by checking in what degree the test results violate the Bell Inequalities.

Degree of Indeterminacy by using statistical analysis: comparing the means, mediums, standard deviations, variance, distributions of the outcomes.

Degree of Locality: Predictions versus real measurement outcomes. That may be compared to the models of hidden variables.

Entangled Particles: In quantum physics, the state of one particle has an instantaneous effect on the state of its entangled particle, no matter how far away they are of each other. This is NonLocality.

By measuring the spin of one particle, the spin of its entangled particle is immediately known, defying the classical physical intuition.

Epigenetics study the heritable traits, that do not change the DNA sequence, and may result from normal development or from environmental conditions, such as stress, toxins, diet, etc. DNA methylation, as a strong

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epigenetic change, has nonlocal effects across generations, therefore passed down to offsprings.

Ecosystems: The presence or absence of a species in an ecosystem has cascading effects on the whole chain of species in that ecosystem. These are NonLocal effects. Local effects: feeding, mating, nesting together, or predatory-prey relationships, or plants that are pollinated by insects. NonLocal and Local Effects occur by the interaction between the ecosystems. For examples, the whales travel long distances from a sea (or ocean) zone to another water zone, connecting various ecosystems (NonLocality). Similarly the migratory birds.

Blockchain Systems: Social Networks, Brain Networks (neuronal interactions), Financial/Economic/Commercial/Cultural/Political etc. Networks function as blockchain systems, where the NonLocal interactions facilitate the transactions between multiple nodes.

If two nodes are adjacent, the communication between them is Local, but for non-adjacent nodes it is a NonLocal interaction.

Each node has two types of functionalities: Local and NonLocal simultaneously.

In general, in an open system, its elements has practically local interactions, partially nonlocal interactions, partially indeterminate interaction when the hidden variables of the environment influence the decoherence process.

MultiAction at a Distance and (MultiLocality, MultiIndeterminacy, MultiNonLocality)

MultiNonLocality caused by MultiAction at a Distance in Newton's Law of Universal Gravitation and in Superposition

Electromagnetic and gravitational forces instantaneously act at a distance. Newton's Law of Universal Gravitation states that, in the universe, a particle attracts another particle with a force that is direct proportional with the product of their masses, and inversely proportional with the square of the distance between them.

For objects, their masses are considered concentrated at their centers of gravity.

$$F = G \cdot \frac{m_1 m_2}{r^2},$$

where F = attraction force; G = the universal gravitational constant; m_1, m_2 = the masses of the two particles (or objects); r = the distance between the two particles (or objects).

Herein too, we have a MultiAction at a Distance, for example many objects at various altitudes starting to fall on the Earth at the same time. SO, the Earth has an action (attraction) at a distance on each object separately, or MultiNonLocality.

MultiNonLocality caused by MultiAction at a Distance in Superposition

The Superposition Principle enables us to calculate the force exerted on a charge by considering the effects of multiple other charges. To illustrate, let's consider three charged particles. Using Coulomb's Law, we can determine the force between any pair of these particles. According to the Superposition Principle, the total force acting on any single charge is the vector sum of the individual forces exerted by each of the other charges, as if each of these charges were the only one present. This means that we add up the forces from each charge independently to find the overall force on the target charge.

Coulomb's Law in scalar form

The Coulomb's Law in scalar form is the following:

$$|F_{12}| = k_e \cdot \frac{|q_1| \cdot |q_2|}{r_{12}^2} = \frac{|q_1| \cdot |q_2|}{4\pi\epsilon_0 \cdot r_{12}^2},$$

where F_{12} = the electrostatic (attractive or repulsive) force between point charges q_1 and q_2

q_1, q_2 = point charges

r_{12} = distance between charges q_1 and q_2

k_e = Coulomb's constant

$k_e = \frac{1}{4\pi\epsilon_0}$, where ϵ_0 is the electric constant

| | means absolute value.

Coulomb's Law states that the absolute value of electrostatic force between two charged particles (points) is directly proportional to the product of the magnitudes square of the distance between them (similar to the Newton's Law of Universal Gravitation).

Opposite charges attract each other, while the like charges repel each other.

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Superposition Formula

For multiple charges, the total force on a particular charge is the vector sum of the forces exerted by all other charges.

$$F_i = k_e \sum j \neq i \frac{q_i q_j}{r_{ij}^2} \hat{r}_{ij},$$

where r_{ij} is the unit vector from q_i and q_j .

The Law of Superposition is an extension of Coulomb's Law from two to three or more point charges, for linear bilateral networks.

On a single point charge many forces act from the other point charges:

Therefore, one has some multi-action at a distance, and correspondingly MultiNonLocality.

MultiLocality

MultiLocality results from a group of things that touch and influence together two by two.

MultiIndeterminacy

While *MultiIndeterminacy* is produced by hidden variables, unclear environments, uncertainty between many Local and NonLocal interactions, as a result of MultiActions locally and MultiActions at a Distance.

Conclusion

In this article, I introduced a new neutrosophic principle (The Principle of Partial Locality, Partial Indeterminacy, and Partial Non-Locality) that extends and generalizes the concepts of locality and nonlocality by addressing scenarios involving indeterminacy.

Locality pertains to interactions confined within a limited space or time, with effects restricted to the immediate environment. In contrast, nonlocality refers to interactions between entities separated by space or time, where changes in one location instantly affect another without intermediaries. Indeterminacy involves hidden variables, such as nonlocal connections between partially entangled objects.

This principle works within a dynamic neutrosophic system.

Practical examples from different fields are provided.

Toward a Generalized Principle of Locality, Indeterminacy, and Nonlocality in Dynamic Systems

The Principle of Partial Locality, Partial Indeterminacy, and Partial NonLocality implies an interplay of locality, indeterminacy, and nonlocality acting in a dynamic neutrosophic system. A generalization of (Locality, Indeterminacy, NonLocality) is the (MultiLocality, MultiIndeterminacy, MultiNonLocality). *MultiLocality* results from a group of things that touch and influence together two by two. *MultiIndeterminacy* is produced by hidden variables, unclear environments, uncertainty between many Local and NonLocal interactions, because of MultiActions locally and MultiActions at a Distance. While *MultiNonLocality* is caused by a MultiAction at a Distance.

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The MultiAlist System of Thought

The goal of this short paper is to expand the concepts of ‘pluralism’, ‘neutrosophy’, ‘refined neutrosophy’, ‘refined neutrosophic set’, ‘multineutrosophic set’, and ‘plithogeny’ (Smarandache 2002, 2013, 2017, 2019, 2021, 2023a, 2023b, 2023c), into a larger category that I will refer to as MultiAlist (or MultiPolar). As a straightforward generalization, I propose the conceptualization of a *MultiPolar System* (different from a *PluriPolar System*), which is formed not only by multiple elements that might be random, or contradictory, or adjuvant, but also by accepting features from more than one basic system (UniPolar, BiPolar, TriPolar, or PluriPolar systems). PluriAlist is a closed dynamic system without neutralities nor indeterminacies, while MultiAlist is an open dynamic system with neutralities and indeterminacies. PluriAlist is a uni-system (formed by elements from a single system), while MultiAlist is a MultiSystem (formed by elements from many systems).¹

Monism, Dualism, Trialism, Pluralism, Neutrosophy, Refined Neutrosophy, MultiNeutrosophy, Refined Neutrosophic Set, MultiNeutrosophic Set, Plithogeny, Multialism, Zoroastrianism, Neutral Monism, neo-Vedanta.

Many casual interactions with non-Western peers from academics have opened my eyes during the past two decades to themes that – except for a few committed and non-biased specialists – are still approached superficially in what we still call *The Occident*. In our Western World, some Eastern ideas, principles, and actions remain misunderstood or wrongly judged, because we still have an obstinacy to fit them without nuances into our unique methods of thoughts.

¹ A version of this paper, Florentin Smarandache: “The MultiAlist System of Thought (philosophical essay).” *Neutrosophic Sets and Systems*, Vol. 61, 2023, 598-605, https://digitalrepository.unm.edu/nss_journal/vol61/iss1/.

Preliminary Remarks

The frequent visits I made to the Non-Western World, to international conferences and scientific seminars, or postdoctoral in applied mathematical and technological research, provided me with an unmediated contact with these diverse cultures, allowing me to improve the understanding of their systems of thinking, and resulting in many traveling memories I wrote about their custom, religion, philosophy, history, geography, and life.

In this regard, *Zoroastrianism* serves as an illustration. Its somehow paradoxical aspects bedazzle most Western observers, making them confused when they try to categorize the religion among monotheistic, dualist, or pluralist systems. However, imposing concepts whose meanings have been referenced to other doctrines will not succeed in an attempt to fully define this religion, and rather than pointing out monotheistic or polytheistic features, or even prompt neutrosophic features – as I did myself in one of my scilogs (Smarandache, 2023, 84 et ss.) – would it not be more beneficial for thinking to broaden the current categories?

Alternatively, we may look in the Western philosophy at the *neutral monism*, which – to put it simplistically – holds that the mind and body are not two distinct entities, but are rather *composed of the same neutral “stuff”*, or as a fluid (indeterminate) margin between non-physical and physical (Smarandache 2023c). In this respect, David Hume proposed “impressions” or “perceptions” as primary realities of experience, while William James thought that the *neutral core material* is a “booming, buzzing confusion” called “pure experience”, and Bertrand Russell, more towards our times, referred to the *neutral entities* as “sensibilia”. *Neutral monism* is actually pluralist² in that it recognizes the existence of multiple such elements (as opposed to metaphysical monism), but it is monist in that it holds that the fundamental components of the universe are all of the same kind (against mind-body dualism). Since we do not fall strictly into the category of monism anymore, by accepting neutralities or indeterminacies – would it not be more beneficial for thinking to broaden the current categories?

In what follow, I will provide a few more examples of this kind; however, I have no doubt the readers can add their own examples to complete

² Griffin, N. (1998). ‘Neutral monism’. In *The Routledge Encyclopedia of Philosophy*. Taylor and Francis. Retrieved 23 Dec. 2023, <https://www.rep.routledge.com/articles/thematic/neutral-monism/v-1>.

the picture. The examples are not limited, but the question persists: would it not be more beneficial for thinking to broaden the current categories?

It happened that I was reading a very recent study by Ethan Brauer once the sketch of an answer to the above question has settled on its own on the paper. Brauer's extensive paper addresses a completely different and narrow topic, but which can be expanded from its limited sphere – modal analysis of potential infinity. Brauer extended a theory of classical second-order arithmetic to include intrinsically well-motivated axioms for lawless sequences.³ Free choice sequences are central to the intuitionistic theory of the continuum, but since intuitionistic analysis theorems defy the classical analysis, many mathematicians reject the concept. (Brauer)

Mutatis mutandis, our quest is similar.

UniPolar, BiPolar, TriPolar, PluriPolar, and more general MultiPolar Systems. Definitions and examples

In this section, I will scrutinize definitions and meanings of the basic Western systems (of organization) of thoughts, and exemplify them, including scenarios from Eastern doctrines.

Monism: all is one

Monism is a philosophy and metaphysical doctrine that postulates a single, ultimate, cohesive reality. The universe is composed of a single, overarching ‘idea’ or ‘substance’, or only one ultimate deity, $[A]$. Everything else is just a manifestation of this one reality/substance/deity. This is a UniPolar System,

i.e. $[A] = \infty$,

where $[A]$ is an ‘idea’, a ‘substance’, *et caetera*, and ∞ is ‘world’, ‘reality’, ‘all’.

The monist schools of philosophy claim that either everything is material (materialism) or everything is mental (idealism), and abolish the distinction between the body and the mind in favor of explaining all phenomena as expressions of a single unifying principle.⁴

Christian Wolff coined the term ‘monism’ in the eighteenth century in his work “Rational Thoughts” [German Logic] (1728): “we must admit of one necessary, self-existent Being” (Wolff, 1770). Wolff delves further into

³ Which leaded Brauer to a theory that is called MCLS.

⁴ O'Conaill, D.(2019). 'Monism.' In *The Routledge Encyclopedia of Philosophy*. Taylor and Francis. Retrieved 21 Dec. 2023, from <https://www.rep.routledge.com/articles/thematic/monism/v-2>.

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the systems of mind-body connection in the “Psychologia Rationalis” (1734). He believes in the validity of Leibnizian monadology, but only applied to ideas, refuting the monistic panpsychism that is central to Leibniz’s metaphysics.⁵

Looking back in time and towards the East, monism has been widely discussed in connection with the Indian philosophy, particularly in “Uttara Mīmāṃsā” (also known as “Vedānta”). Many schools of thought have emerged out there, all basing their doctrines on the authority of the same corpus known as “Prasthānatrayī”.

In Hinduism, the idea of Brahman — the ultimate reality or supreme cosmic power — is frequently connected to monism. Most Hindus follow monastic principles and hold that Brahman is everything and everything is Brahman.⁶ The philosophy of Advaita Vedānta, which is frequently referred to as a type of absolute nondualism, also reflects this viewpoint.

In one accessible simplification, one can reduce the monism to two types: a substantive monism, in religions like Buddhism and Hinduism in the East, or philosophers like Spinoza in the West, and attributive monism, with sub-types as idealism, physicalism, or neutral monism. The first reduces the reality to a single substance, or states that the world is only varied because this one substance exists in plural forms, while the second asserts that there is a one category of being that encompasses a wide plurality of distinct objects or substances.

Despite being essentially monistic, attributive monism appears to be rather pluralistic, but substantival monism is strongly hostile to pluralism.

In that it reduces the physical cosmos to a single principle, pantheism is similar to monism: “Pantheists are monists” (Owen, 1971, 65), even though the pantheist deity is imperfect, expanding and continuously creating, or also extending beyond space and time in panentheism — a conception of God present as well in some Christian confessions — therefore surpassing the simplification of monistic attribution.

⁵ Hettche, Matt and Corey Dyck, “Christian Wolff”, *The Stanford Encyclopedia of Philosophy* (2019), Edward N. Zalta (ed.). Retrieved 17 Dec. 2023, from <https://plato.stanford.edu/archives/win2019/entries/wolff-christian>.

⁶ Leeming, D.A. (2014). ‘Brahman.’ In: Leeming, D.A. (eds) *Encyclopedia of Psychology and Religion*. Springer, Boston, MA. https://doi.org/10.1007/978-1-4614-6086-2_9052.

Dualism: all is two

Dualism explains the world (or reality) by two fundamental, diametrically opposed, and irreducible principles. In religion, it generally refers to the conviction that the universe was created by two ultimate antagonistic forces, gods, or groups of angelic or demonic creatures. Since dualism is a system formed by two contrasted parts, this is a BiPolar System:

$$\text{i.e. } [A] + [\text{anti}A] = \infty.$$

where $[A]$ is an ‘idea’, a ‘substance’, *et caetera*, $[\text{anti}A]$ is its opposite or negation, and ∞ is ‘world’, ‘reality’, ‘all’.

I would probably not be wrong if I affirmed that this system is for ages a dominant worldview in Western way of thinking, with Descartes and Hegel being the first two figures that spring to mind, completed by Kant’s cognitive dualism, which distinguished between the faculties of sensibility and understanding.

Examples of epistemological dualism include being and thought, subject and object; and, on the other hand, examples of metaphysical dualism being matter and spirit, body and mind, good and evil.

Glancing eastward, I observe that most historians of religion use the ancient Iranian religion Zoroastrianism as a clear case of eschatological dualism, advocating that it is based on two conflicting principles: Ahura Mazda, the deity of light and truth, and Angra Mainyu, the destroying enemy.

An ongoing conflict exists between the good, spiritual realm of light and the bad, material realm of darkness, according to the ancient Iranian religion of Manichaeism.

Furthermore, as its name says by itself, *dvaita* — the Sanskrit word *dvaita* actually means ‘dualism’ (Flood, 1996, 245) — is a dualist school of *Vedanta*, asserting that there is an everlasting separation between the particular self and the ultimate, in opposition to the *advaita* (non-dualist) philosophy.

Although *dvaita* was dualist in that sense, it proposed an autonomous God named Vishnu as the ruler of the independent and separate entities of matter and soul. More specifically, *dvaita* recognized three absolute and eternally existing entities: God, souls (*atman*), and primordial substance (*prakriti*).

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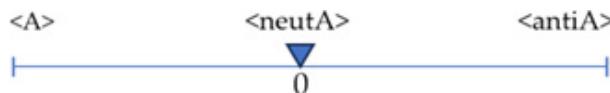
Trialism: all is three

Trialism was introduced in philosophy by John Cottingham as “a grouping of three notions” (Cottingham, 1985, 219), an alternative viewpoint to Descartes’ dualism, with the addition of sensation next to mind and body: “It turns out that there are features that belong to the mind alone, features that belong to the body alone, and what may be called hybrid features – features that belong to man *qua* embodied being” (*Ibidem*; see also Cottingham, 2021).

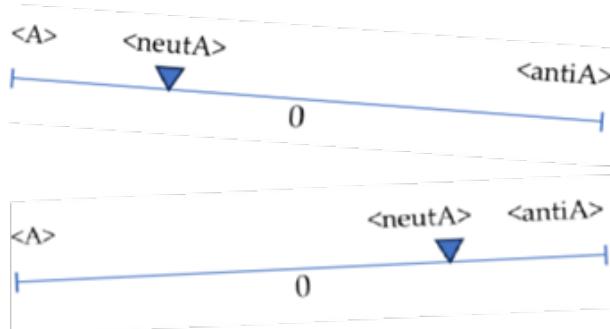
Trialism is thus a system formed by three contrasted or entirely different parts, and similarly, *trichotomy* is a division of three opposites (or entirely different) two by two things.

A three-poles system was also proposed by *neutrosophy* (Smarandache 1995, 2013), which operates with three independent opposites, found in equilibrium: $[A]$, $[neutA]$, and $[antiA]$, called *Neutrosophic Triad*. All ‘ideas’ $[A]$ are considered in conjunction with their opposites or negations $[antiA]$ and the range of neutralities $[neutA]$ between them, while $[nonA]$ is the collective term for the ideas $[antiA]$ and $[neutA]$. In neutrosophy, the three poles may be fluid two by two.

The balance between $[A]$ and $[antiA]$ rests on $[neutA]$. In other words, $[neutA]$ is imagined as a buffer zone between $[A]$ and $[antiA]$:



Moving $[neutA]$ to the left, or to the right, i.e. if the neutral/indeterminacy part is pushed towards $[A]$, or $[antiA]$ (the indeterminacy degree increases), then one of them gets stronger (having less indeterminacy), and the balance gets in disequilibrium:



Based on neutrosophy, the associated TriPolar System can be described as:

$$[A] + [neutA] + [antiA] = \infty,$$

where $[A]$ is an ‘idea’, a ‘substance’, *et caetera*, $[antiA]$ is its opposite or negation, $[neutA]$ is the range of neutralities between them, and ∞ is ‘world’, ‘reality’, ‘all’.

I point out here no more than that the neutrosophy is an extension of both the ancient Chinese Yin-Yang philosophy and dialectics (Smarandache 2013), and also remind the reader that the trialism was associated with Christianity as well, e.g. for holding that human beings are composed of three separate essences: a body, a soul, and a spirit.⁷

Pluralism: all is plurality

Pluralism is a worldview of plurality, used in philosophy to contrast with monism (the idea that everything is one), with dualism (the idea that everything is two), and arguably with trialism (the idea that everything is three). Pluralism can be defined as a system in which more than two (arguably three) groups, principles, states, ideas, *et caterea*, coexist. This is a PluriPolar System:

$$[pluriA] = \infty,$$

where $[pluriA]$ means more than two (arguably three) ‘ideas’, *et caetera*, and ∞ is ‘world’, ‘reality’, ‘all’.

In metaphysics, pluralism is the idea that reality is actually made up of a variety of substances found in nature, while in ontology the concept describes various forms, kinds, or modes of existence.

Buddhism is given as an example of a pluralistic religion. Many Buddhist traditions do not declare a single ultimate truth and recognize the validity of multiple paths to enlightenment, advocating conversation and understanding with people of other faiths.

Another example might be the Bahá’ Faith, which holds that all major faiths have the same spiritual basis, are descended from the same divine source (God), and differ only in their social teachings in accordance with the necessities of the eras in which they were revealed.

⁷ This understanding stems from taking 1 Thessalonians 5:231 literally: “And the very God of peace sanctify you wholly; and I pray God your whole spirit and soul and body be preserved blameless unto the coming of our Lord Jesus Christ.”

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MultiAlism: all is open

I observed in the short, quick and without going into depth evaluation of the basic systems that I previously discussed that it is challenging to strictly include some non-Western doctrines (or even Western!) in one group or another. Certain doctrines/ideologies/ideas acknowledge several components from various systems. Some beliefs are classified as monistic, yet they clearly contain components of pluralism as well; others, on the other hand, are classified as nondualistic but cannot be classified as either strictly UniPolar, or PluriPolar systems. Nor the concept of nonduality, a common thread in Taoism, Mahayana Buddhism, or Advaita Vedanta (Loy, 1998), does suffice, being a rather fuzzy concept, which might finally include anything that does not fall into a BiPolar System of thought, regardless of distinctions, or mutations.

Numerous schools of thought have extensively examined the dynamics between the opposites $[A]$ and $[\text{anti}A]$. These concepts are known by various names, including dialectics, Yin-Yang, Manichaeism, dualism, Dharma-Adharma, and many others. However, the neutral (or indeterminacy) part ($[\text{neut}A]$) between these opposites has rather either been ignored or retracted. The neutral or indeterminate, as I emphasized in my studies on neutrosophic theory (Smarandache 2002, 2013), usually intervenes in the dynamics (or conflicts) from one side or the other, tipping the balance in one direction or the other. The boundaries between the opposites can be either fluid (when there is some overlapping or indeterminate/neutral part between the opposites) or rigid (when $[A]$ and $[\text{anti}A]$ are clearly separated).

In Occasionalism, for example, the God is a neutral ($[\text{neut}A_1]$) between mind ($[A_1]$) and body ($[\text{anti}A_1]$), as a particular case, i.e. where one has only one dynamic, between $[A_1]$ and $[\text{anti}A_1]$ (one neutrosophic triad). In MultiAlism, one has dynamics between many neutrosophic triads:

$([A_1], [\text{neut}A_1], [\text{anti}A_1]), ([A_2], [\text{neut}A_2], [\text{anti}A_2]), \dots$

And so forth.

By convention let's use the prefix "*pluri*" when talking about the elements of a single system, and "*multi*" when talking about the elements of many systems.

Therefore, the PluriPolar System accepts and deals with the dynamicity of opposites, but not with the neutralities or indeterminacies between them:

$$[(\text{pluri})A] + [(\text{pluri})\text{anti}A] = \infty.$$

This simple observation instigated the idea of a generalizing and integrative construct into which to accommodate theories that mix parts from many systems. I unpretentiously call this construct *multialism*, and clearly differentiate it from *pluralism*, and consequently call the related system the *multialist system*, conceiving it as a *MultiPolar System* that accepts and is open to combinations of opposites and neutrals (indeterminacies), e.g.:

$$\llbracket(\text{multi})\text{A}\rrbracket + \llbracket(\text{multi})\text{neutA}\rrbracket + \llbracket(\text{multi})\text{antiA}\rrbracket = \infty.$$

The MultiPolar System accepts and deals with neutralities and indeterminacies between the opposites, but it is not necessarily to contain them. As such, the MultiPolar System is an extension of the PluriPolar System.

Let us test out two examples from religion before returning with more in-depth studies in later papers.

Zoroastrianism

Zoroastrianism offers a perplexing picture of a religion (about the state and prospects of the study of this religion, a must read is Stausberg, 2008) whose followers worship several sacred beings, called *yazatas*, in addition to a single deity, *Ahura Mazda* (or *Ohrmazd* in Middle Persian).⁸

These *yazatas*⁹ —somehow remembering us the Roman tutelary deities *Lares*¹⁰— include natural objects or phenomena (earth, water, wind, sun, moon, etc.). Other individual deities manifest their presence, among which *Anahita* (fertility), *Armaiti* (right-mindedness), *Ai* (reward), or *Rasnu* ('justice'). Furthermore, *Ahura Mazda*'s faces strong opposition from the personification of evil, *Ahreman* in Middle Persian (or *Angra Mainyu* in Avestan). Its only goal is to ruin *Ohrmazd*'s good world.

This makes the Zoroastrianism to Hintze to be both dualistic, polytheistic, and monotheistic (a “mixture of seemingly monotheistic, polytheistic, and dualistic features”, Hintze, 2014, 225 et ss.), in an attempt to put an end to the debates in literature which went from defining Zoroastrianism as a “dualistic monotheism” (Gnoli, 1994, 480) to a

⁸ Duchesne-Guillemin, Jacques. “Zoroastrianism”. *Encyclopedia Britannica*, 8 Nov. 2023, <https://www.britannica.com/topic/Zoroastrianism>. Accessed 11 December 2023.

⁹ Britannica, The Editors of Encyclopaedia. “yazata”. *Encyclopedia Britannica*, 3 Apr. 2014, <https://www.britannica.com/topic/yazata>. Accessed 11 December 2023.

¹⁰ Britannica, The Editors of Encyclopaedia. “Lar”. *Encyclopedia Britannica*, 14 Feb. 2018, <https://www.britannica.com/topic/Lar-Roman-deities>. Accessed 11 December 2023.

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“monotheistic dualism” (Schwartz, 2002, 64). Added to this are the interpretations of existence of a *Divine Triad*, or a *dialogical triad* in Zoroastrianism: “The Deity is also not a monadic one, but a dialogical triad (and there may be other aspects) who exists in relationship” (Louchakova-Schwartz, 2018, 481).

Furthermore, I observe the obvious neutrosophic features of *yazatas*: the balance between good and evil tilts according to their (neutrosophic) actions (*vedi supra*, 2.3).

In our approach, these characteristics makes the *Zoroastrianism a multialist religion*, including elements from all basic systems:

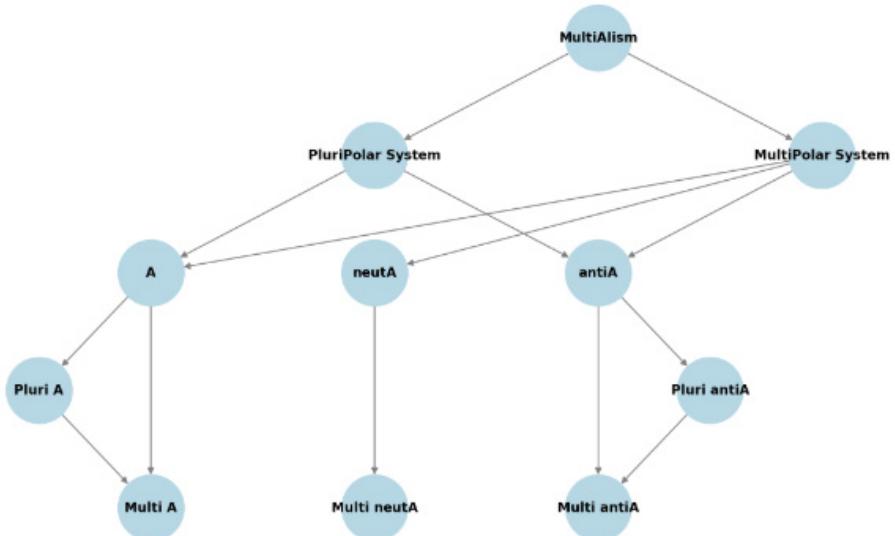
$$[A] [Ohrmazd] + [(multi)A] [deities] + \\ + [neutA] [actions of yazatas] + [antiA] [Ahreman] = \infty.$$

Vedanta and neo-Vedanta schools

Other instances of *multialism* are generated by the different interpretations of Vedanta. Independently, the Vedanta schools may appear utterly distinct due to significant discrepancies in ontology, soteriology, and epistemology. Let us remind the main schools of Vedanta, and their interpretations: Advaita (non-dualism), Dvaitadvaita (difference and non-difference), Vishishtadvaita (qualified non-dualism), Dvaita (dualism), Suddhadvaita (pure non-dualism), Achintya-Bheda-Abheda (inconceivable difference and non-difference) (Isaeva, 1992; Clooney, 1993). Coming closer to our days, modern developments (so-called neo-Vedanta) propagated the idea that the divine, the absolute, exists within all human beings. Acceptance of many kinds of worship is a key component of Swami Vivekananda’s philosophy, an exponent of neo-Vedanta, emphasizing the idea of *acceptance* rather than *tolerance*. This neo-Vedanta school holds that no other types of worship are incorrect. Life is a quest trip from one truth to another, from a lesser truth to a greater one. The truth is not anyone’s property, and the nature of all souls is truth. Vivekananda “reconciles Dvaita or dualism and Advaita or non-dualism” (Sooklal, 1993, 48). According to Vivekananda, the perfect man possesses all the components of philosophy, mysticism, passion, action in right measure to create a harmoniously balanced whole (*Ibidem*, 42). To my understanding, the components are supposed to exist in a balanced (and hence *neutrosophic*) manner rather than just in their *plurality*, and yet being monistical manifestations of *one*,

i.e. $[A] + [(multi)A] + [neutA]$,

which makes me consider it a *multialist doctrine*.



Graph 14. **Diagram of MultiAlism: PluriPolar vs. MultiPolar Systems**
The diagram visually represents the core ideas of MultiAlism and its distinction from PluriPolar and MultiPolar systems.

Toward a Framework of MultiPolar Thought

As an extension of the concepts of ‘pluralism’, ‘neutrosophy’, ‘refined neutrosophy’, ‘refined neutrosophic set’, ‘multineutrosophic set’, and ‘plithogeny’ (Smarandache 2002, 2013, 2017, 2019, 2021, 2023a, 2023b, 2023c), I introduced in this short essay the concept of MultiAlism, to which corresponds a MultiPolar system of thought. A possible advantage of this system could free from ambiguities the other systems, especially the PluriPolar system, where *plural elements* – more or less equal – coexist or are tolerated to exist and contains their opposites, but not their neutralities or indeterminacies between them; while the MultiPolar system is open to accept in various combinations and mutations, the opposites and their neutralities or indeterminacies between them, from *more than one system*. In other words, the UniPolar, BiPolar, TriPolar, and PluriPolar systems are uni-valent systems (one excludes the other), whilst the MultiPolar System is a multi-valent system (it includes more than one system) and accepts neutralities and indeterminacies between opposites.

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Neutrosophy Transcends Binary Oppositions in Mythology and Folklore

Our analysis posits that the mythological and folkloric composite entities (hybrid and superhybrid creatures) serve as compelling evidence that the human psyche consistently transcends binary oppositions as in neutrosophy. Across diverse cultures and epochs, the human mind exhibits a propensity for nuanced and neutrosophic vantage points, defying simplistic categorizations.

Neutrosophy, Transcendence, MultiAlism, Mythology, Cultural Identity, Cultural Practices, Hybrids, SuperHybrids, Mythological Creatures, Divine Parentage, Heredity.

Hybrid (and SuperHybrid) entities that appear in mythologies and folklore from around the world have been thoroughly explored in cultural studies. A branch of mythological studies — which could be termed ‘mythological teratology’— might emerge to delve into the examination of these monsters and hybrid beings (see below *Remarks & Open Questions*). This concept of the ‘hybrid being’ as a reflection of society and its norms is a recurring theme in various academic disciplines, including sociology, or psychology. For instance, Joseph Campbell explores the role of mythical beings in culture and society, arguing that they reflect societal fears and desires [Campbell]. Similarly, Carl Jung’s concept of the ‘archetype’ discusses how society creates mythical beings out of what it rejects or finds disturbing [Jung]. Cohen examines how these monsters function within culture and society, suggesting that they mirror both societal anxieties and aspirations, proposing a *modus legendi*, i.e. “a method of reading cultures from the monsters they engender” [Cohen]. Kristeva explores the concept of “abjection,” a term she borrows from psychoanalysis to describe the feeling of horror that arises when encountering something that disturbs the boundaries between the self and the other [Kristeva].

Preliminary Remarks

The hybrid mythical beings, combining human and animal characteristics or blending divine and mortal traits, are viewed as anomalies or departures from the natural order. Those entities embody a paradoxical nature that outstrips conventional logical frameworks and established protocols. These beings exist beyond the confines of predictable patterns and imposed rules, serving as agents of disruption within structured systems, while emerging as a byproduct of order, arising in defiance of chaos and acting as a counterforce that delineates and fortifies the boundaries of structure.

Moreover, these hybrid beings are not arbitrary creations but rather essential constituents of civilization, originating from the very tenets that societies cherish. They generally personify all aspects that are repudiated and contradicted by societal norms and values. Through the identification and marginalization of these undesirable elements, society reaffirms its own identity and principles.

Consequently, the hybrid being transforms into a negative reflection, a distorted mirror image of society, underscoring its fears, taboos, and limitations. By confronting and interacting with these entities, society attains a deeper comprehension of its own contradictions, thereby contributing to its continuous (neutrosophic) evolution and self-definition in the (neutrosophic) dynamic system of life.

For more on the topic, a rich chapter of reading suggestions at the end of the paper¹ (see *Further readings*). It is merely a brief overview of some neutrosophic and multialist features of a small number of hybrids, but revealing in their significance. The MultiAlism is a MultiPolar System which is formed not only by multiple elements that might be random, or contradictory, or adjuvant, but also by accepting features from more than one basic system (UniPolar, BiPolar, TriPolar, or PluriPolar systems).

This article is also an encouragement to specialized researchers to interrogate the ‘mythological teratology’ using neutrosophic tools and perspectives, and it is —why not?— an attempt to transcend some common questions about the emergence and perpetuation of these quasigeneral creatures in worldwide mythologies.

¹ Published in: Smarandache, Florentin (2024). “Neutrosophy Transcends Binary Oppositions in Mythology and Folklore.” *Neutrosophic Sets and Systems* 65, 57-79. https://digitalrepository.unm.edu/nss_journal/vol65/iss1/4

Neutrosophic Identities: Mythical Hybrids and Mythical SuperHybrids

Let us select a few examples from the vast array of imaginative fields, then briefly, but systematically analyze how these hybrids are composed. As a general structure of the hybrids, one might categorize as ‘Mythical Hybrids’ the creatures that might be formed by the union of two entities (be it part animal + part human, or part animal + part deity, or part human + part deity, or part demon + part human, or part demon + part animal, or part demon + part deity) and as ‘Mythical SuperHybrids’, or ‘MultiAlist Hybrids’ the creatures that might formed by union of at least three entities (e.g. part deity + part human + part animal), or by combinations within different types of the same entity (e.g. Animal₁ + Animal₂ + ... + Animal_n).

- In Mesopotamian mythology, *Gilgamesh* stands as a demigod, embodying a fusion of divine and mortal heritage. Described as two-thirds divine and one-third mortal, Gilgamesh’s case presents a complex blend of maternal and paternal divinity. The duality of his nature, being both divine and mortal, becomes a central theme in the narrative, influencing his actions, struggles, and ultimate quest for meaning and immortality. The ambiguity surrounding his eventual fate in later traditions introduces an element of incompleteness, allowing for diverse interpretations [Gilgamesh].
- *Lamassu* is a protective deity in the Mesopotamian mythology with the body of a bull or lion, wings of an eagle, and a human head. These colossal beings often served as guardians at the entrances of palaces and temples [Lamassu].
- *Bhima* is one of the central characters in the ancient Indian epic, the *Mahabharata*. He is the second of the five Pandava brothers, born to Kunti, the queen of Hastinapura, and the wind god Vayu. Bhima is known for his exceptional physical strength, courage, and prowess in battle. Bhima plays a crucial role in various events, including the Pandavas’ exile to the forest, the gambling match at the court of Hastinapura, and the Kurukshetra War, the epic battle between the Pandavas and the Kauravas. He is often portrayed as a larger-than-life figure, capable of extraordinary acts of valor and heroism. Despite his formidable strength, Bhima is also depicted as a compassionate and kindhearted

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individual, especially towards those who are oppressed or marginalized. His journey is marked by moments of triumph and adversity, ultimately culminating in his role as a key figure in the establishment of dharma on the throne of Hastinapura [Bhima].

- *Achilles*, son of a sea nymph and a mortal king, encapsulates the dichotomy of the demigod in Greek mind. Immersed in the River Styx for invincibility, his vulnerable heel becomes a symbol of incompleteness. The neutrosophic nature unfolds in his death, orchestrated by a mortal's arrow guided by a god. This intersection of mortal susceptibility and divine vengeance underscores the intricacies of Achilles' fate [Achilles].
- *Freyr* is a prominent figure in Norse mythology, often depicted as a handsome and benevolent deity, associated with bountiful harvests, love, and abundance. Despite being considered a god in Norse mythology, Freyr's status as a demigod is underscored by his dual parentage, with one parent being a god (Njord) and the other a giantess named Skadi. Freyr's most famous possession is his magical sword, known as "Freyr's Sword" or "Sumarbrandr." According to legend, Freyr traded away his sword to win the hand of the giantess Gerd, with whom he fell deeply in love. This act of sacrifice ultimately leads to Freyr's downfall, as he is left defenseless during the final battle of Ragnarok, the apocalyptic event in Norse mythology. [Freyr].
- In Islamic tradition, *Burāq* is a mythical creature described as a steed with the head of a woman, the wings of an eagle, and the tail of a peacock. It is said to have transported the Prophet Muhammad during the Night Journey. [Burāq]
- *Banshee*, known as the "woman of the fairies," is a supernatural being deeply ingrained in Irish and other Celtic folklore. Described as a female spirit or fairy, the Banshee is often associated with specific families or clans, serving as a harbinger of death or an omen of impending misfortune. One of the most distinctive features of the Banshee is her mournful wail, a chilling cry that is said to be heard when someone within the family she watches over is about to die. The Banshee is typically depicted as a solitary figure, often appearing as an old woman

with long, flowing hair dressed in a grey or white gown, having features reminiscent of otherworldly or supernatural beings, such as elves, witches, or spectral apparitions. [Banshee]

- *Huli Jing*, or fox spirits, are shape-shifting beings in Chinese folklore. They can transform into beautiful women, but their true form is that of a fox. [Huli]
- The hybrid form of *Abraxas*, with the body of a human, the head of a rooster or lion, and serpentine legs, is laden with symbolic significance.² The human body represents consciousness and intellect, while the animal features symbolize primal instincts and cosmic forces. The rooster, associated with the dawn and awakening, signifies spiritual enlightenment, while the serpent is a potent symbol of wisdom, renewal, and transformation. Abraxas embodies the concept of unity within duality, symbolizing the reconciliation of opposites such as good and evil, creation and destruction, light and darkness. This neutrosophic fusion of contradictory elements reflects the Gnostic worldview, which conceived the material world as a realm of duality and illusion, with the ultimate goal of spiritual liberation through gnosis, or divine knowledge. [Abraxas]
- The concept of the *Homunculus* has historical roots in alchemical and philosophical traditions. In alchemy, the homunculus was believed to be created through various arcane processes, symbolizing the desire to artificially create life.³ The most prevalent ingredient associated with the creation of the homunculus was seminal fluid, believed to contain the essence of life. In addition to semen, other bodily fluids, such as menstrual blood, were sometimes implied as ingredients. Alchemists often implied the use of various alchemical substances, such as salts,

² References to Abraxas can be found in various Gnostic texts, including the Nag Hammadi Library, a collection of ancient Gnostic scriptures discovered in Egypt in 1945. These texts often depict Abraxas as a divine being or archon, sometimes associated with the highest God or as an emanation from the divine realm.

³ One of the most famous accounts of creating a homunculus comes from the writings of the Swiss alchemist Paracelsus, who claimed that a homunculus could be created through the manipulation of seminal fluid. His supposed recipe involved placing semen in a sealed glass vessel along with specific alchemical substances and then incubating the mixture in a warm, dark environment for several weeks or months. Allegedly, after the incubation period, a miniature humanoid creature would form within the vessel.

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minerals, and herbal extracts, believed to possess transformative properties. Using animal seed or other animal derived substances was suggested. The instructions for creating a homunculus would be as follows: 'Mix the semen and sun stone and inseminate the cow or ewe. Carefully plug the animal's vagina with the sun stone. Smear the animal's genitals with the blood of another animal. Place the artificially inseminated animal inside a dark house where the sun never shines.' And so on. [Lugt] From a neutrosophic perspective, the homunculus can be explored as a metaphor for the inherent uncertainties, contradictions, and complexities within biological, philosophical, and symbolic dimensions. The homunculus, as a symbol for the artificial creation of life, embodies ethical and existential implications. Though not entirely human, this entity represents a rational animal, adding another fictional chapter to humanity's aspiration to control the boundaries of life and death. [Homunculus].

- The *Balaur* occupies a prominent role within Romanian folklore, emerging as a multi-headed dragon or serpent,⁴ often intertwined with turbulent weather phenomena and disruptive chaos. Intriguingly, Romanian legends infuse the Balaur's saliva with a peculiar trait, believed to possess the transformative ability to crystallize into 'diamonds'. Symbolically, the Balaur embodies primal energies, encapsulating the essence of chaos and the untamed wilderness, evoking a complex interplay of reverence and trepidation within cultural narratives.
- The *Zmeu*, another entralling figure in Romanian folklore, assumes the guise of a shapeshifting monstrosity, blending traits of both ogre and dragon. Its versatility in assuming diverse forms epitomizes unpredictability, perpetuating an aura of enigmatic elusiveness. Frequently depicted as a malevolent force, the Zmeu embodies themes of fear, guile, and imminent danger, serving as a poignant cautionary motif within cultural tales. Furthermore, its portrayal reflects societal apprehensions,

⁴ Legends describe the Balaur as a monstrous being with sharp claws, scales covering its body, and fiery breath.

symbolizing latent threats, inner conflicts, and the enduring struggle between opposing moral forces.

- Among the spirits of Romanian folklore, the *Zburător* (The One That Flies) emerges as a seductive entity, akin to the incubus archetype.⁵ Appearing in the form of a charismatic man, the *Zburător* seduces unsuspecting maidens, symbolizing forbidden desires and the allure of the unknown. Symbolically traversing the delicate threshold between dreams and reality, the *Zburător* evokes a blend of fear, fascination, and profound introspection within the human psyche. [Chelariu]

Let us try now to integrate these entities into a coherent system.

Offspring of Gods and Mortals: Part Deity + Part Human Hybrids

In the rich tapestry of world mythology, the entities formed of both divine and mortal lineage, often referred to as demigods or demigoddesses, embody a complex blend of traits inherited from their divine parentage and their mortal heritage. The mythologists generally agree that the hybrid beings of such type serve to bridge the gap between the celestial and terrestrial realms, reflecting humanity's innate desire to understand the nature of existence and our place within the cosmos.

Demigods possess a diverse array of characteristics and abilities: they may inherit superhuman strength, agility, or intellect from their divine lineage, while also facing the trials and tribulations of mortality. Despite their extraordinary abilities, demigods are often depicted as flawed and vulnerable beings, grappling with the complexities of their dual nature and the expectations placed upon them by both gods and mortals.

To explore several mythologies, let's illustrate the characters of three representative figures of such beings:

Krishna. In Hindu mythology, Krishna is revered as an avatar of the god Vishnu, born as the son of Devaki, the sister of king Kamsa, and Vasudeva.⁶ [Vishnu] Krishna declined to take up arms in the monumental conflict between the Kauravas and the Pandavas. Instead, he presented an

⁵ Embedded within the broader folklore of incubi and succubi, the *Zburător* embodies the enigmatic male spirit seeking nocturnal liaisons with slumbering women.

⁶ Vasudeva is the patronymic of the deity Krishna, a son of Vasudeva. The worshippers of Vasudeva-Krishna formed one of the earliest theistic devotional movements within Hinduism.

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option: to provide personal guidance to one side and lend his army to the other. A tragic altercation erupted among the Yadava chiefs, resulting in the loss of Krishna's brother and son. Deeply saddened, Krishna retreated to the forest. There, he met his demise when a huntsman, mistaking him for prey, fatally wounded him in his only vulnerable spot—the heel. [Krishna].

Hercules, the son of Zeus and Alcmene, a mortal princess, is a cornerstone figure in Greek mythology, epitomizing the complexities of demigod existence. His divine parentage, coupled with mortal struggles, forms the essence of his narrative. His legendary Twelve Labors, undertaken as penance for killing his wife and children in a fit of madness induced by the goddess Hera, showcase his extraordinary strength, courage, and determination. Zeus, recognizing Hercules' deeds, grants him immortality, emphasizing the dynamic interplay between mortality and the divine in the demigod's journey. [Hercules]

Dagda, "The Good God," is prominent figure in Irish mythology, revered as a powerful and benevolent (semi)deity. He is often depicted as a father figure, a wise leader, and a skilled warrior, embodying the ideals of strength, wisdom, and generosity. Dagda is considered the father or chief of the Tuatha Dé Danann, a mythical race of supernatural beings. He possesses powerful magical artifacts, including a magical club known as the "lorg mór" or "the great staff," which can both kill and resurrect with one end and control the weather with the other. He also possesses a magical cauldron called the "coire ansic" or "the cauldron of plenty," which provides an endless supply of food and drink. He is known for his fondness for indulgence and pleasure, often portrayed as a lover of food, drink, and music. [Dagda]

Hindu Devas: Celestial Intermediaries of Cosmic Balance

In the intricate cosmology of Hindu mythology, demigods, or 'Devas,' occupy a pivotal role as celestial beings who straddle the realms of divinity and humanity. These demi-deities embody a complex interplay of attributes within the framework of neutrosophy, where the concepts of certainty, uncertainty, and indeterminacy converge in a dynamic equilibrium. [Deva]

The origins of demigods in Hindu mythology are shrouded in ambiguity, mirroring the inherent indeterminacy of the cosmic order. Born from the intermingling of divine and mortal lineage, demigods embody the neutrosophic principle of uncertainty, where their existence defies conventional categorization. They inhabit the liminal space between the certainty of divine essence and the uncertainty of mortal flesh.

Demigods in Hindu mythology hold profound cultural and symbolic significance, serving as allegorical representations of the cosmic balance between order and chaos. Through their stories and legends, demigods inspire introspection, reflection, and a deeper understanding of the neutrosophic principles that govern the universe. They offer timeless insights into the complexities of existence and the eternal quest for equilibrium and harmony.

Several demigods in Hindu mythology exemplify the principles of neutrosophy through their complex and multifaceted nature.

Indra, the king of the Devas, embodies the neutrosophic principle of opposition as he wages war against the forces of darkness while facing internal conflicts and moral dilemmas.

Agni, the god of fire, symbolizes the neutrosophic concept of indeterminacy as he serves as both a purifier and a destroyer, embodying the dual nature of fire as both creator and destroyer.

Varuna, the god of cosmic waters, represents the neutrosophic notion of partial truth as he upholds the cosmic order while grappling with his own limitations and imperfections.

Surya, the god of the sun, embodies the neutrosophic principle of ambiguity as he illuminates the universe with his radiant light while casting shadows of doubt and uncertainty.

Vayu, the god of the wind, symbolizes the neutrosophic concept of complementarity as he breathes life into all living beings while also carrying the seeds of destruction and change.

Greek Demigods: Exploring Heroic Archetypes

In the vast and intricate tapestry of Greek mythology, demigods stand as remarkable figures, occupying a unique space between gods and mortals. Born of unions between divine beings and humans, these hybrid heroes possess extraordinary abilities, courageous hearts, and complex destinies that shape the course of myth and legend. This inherent duality reflects the neutrosophic principle of indeterminacy, where demigods exist in a state of perpetual flux, neither fully divine nor entirely mortal.

Among the pantheon of Greek demigods, several figures stand out as exemplars of heroic archetypes, each embodying the principles of neutrosophy in their own unique way.

Heracles (Hercules), the son of Zeus and Alcmene, epitomizes the struggle against adversity and the quest for redemption. His Twelve Labors

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symbolize the neutrosophic concept of opposition, where seemingly contradictory forces coexist and interact in a dynamic equilibrium.

Jason, the son of two mortals though conceived by Zeus, demonstrates leadership, charisma, and diplomacy as the leader of the Argonauts on their quest for the Golden Fleece. He navigates political intrigue and personal challenges with tact and resilience, embodying the principle of balance and harmony in relationships and endeavors.

Another prominent demigod, Perseus, born of Zeus and a mortal princess, represents the neutrosophic principle of indeterminacy through his quest to slay the Gorgon Medusa and rescue Princess Andromeda. His journey is fraught with uncertainty and ambiguity, yet he perseveres through cunning, resourcefulness, and sheer determination. Perseus embodies the neutrosophic notion of partial truth, where reality is inherently subjective and open to interpretation. Perseus, embarks on legendary feats, including the slaying of the Gorgon Medusa. His death lacks a singular narrative, illustrating the incompleteness inherent in the portrayal of demigod destinies. Whether Perseus meets his end in battle or through a discus throw remains a subject of interpretation, adding an indeterminate layer to his demigod status. [Kerényi]

Tuatha Dé Danann and Fomoire: Divine-Human Lineage in Celtic Mythology

Within the fabric of Celtic mythology, the Tuatha Dé Danann⁷ emerge as enigmatic figures, embodying a complex fusion of divine and mortal lineage. The earliest accounts depict their banishment from heaven due to their profound knowledge, after which they descended upon Ireland enveloped in a shroud of mist. [Tuatha].

The ancient enemies of the Tuatha Dé Danann were the Fomoire, another group of supernatural beings in Irish mythology. The Fomoire are a race of monstrous, semi-divine beings, often described as a chaotic and malevolent force, associated with darkness, chaos, and the destructive forces of nature. They are portrayed as monstrous sea creatures or giants [Fomoire].

⁷ Translating to “the people of the goddess Danu,” who represents the primordial waters of creation and fertility, these semidivine beings are revered for their wisdom, magic, and profound connection to the land before the arrival of the Milesians, who are considered the ancestors of the modern Irish.

According to Irish mythology, the Fomoire were among the earliest inhabitants of Ireland, predating the arrival of the Tuatha Dé Danann. They were said to have arrived in Ireland from distant lands and waged war against the Tuatha Dé Danann for control of the island. The battles between the Fomoire and the Tuatha Dé Danann are depicted as cosmic struggles between the forces of chaos and order, with the Fomoire representing chaos and darkness,⁸ and the Tuatha Dé Danann representing light and civilization.

The Tuatha Dé Danann are skilled in magic, shape-shifting, and other forms of arcane knowledge, yet they also experience human emotions, desires, and vulnerabilities. Several key figures among the Tuatha Dé Danann exemplify the neutrosophic themes of certainty, uncertainty, and indeterminacy through their complex parentage and lineage:

The *Dagda*, for example, is sometimes portrayed as the son of the goddess Danu and the mortal prince Elatha, reflecting the intertwining of divine and human elements within his lineage. Similarly, *Lugh* is depicted as the son of a mortal man, Cian, and a supernatural being, Ethniu, highlighting his hybrid nature and the ambiguity of his identity.

Hybridization of Humanity and Demonology: Part Demon + Part Human Hybrids

Mythology often features beings that are hybrids part demon and part human. While the specific traits and appearances of these beings can vary widely across different cultures and mythologies, here are a few examples:

Cambions: In European folklore, cambions are offspring of a demon and a human. They are often depicted as possessing some of the supernatural powers of their demonic parent, such as shapeshifting, telepathy, or dark magic, along with the physical appearance of humans. Cambions are sometimes portrayed as seductive and manipulative figures, using their powers to influence or deceive mortals.

Nephilim: In Judeo-Christian mythology, nephilim are the offspring of angels⁹ and humans. They are described in ancient texts like the Book of Genesis as giants or mighty warriors. Nephilim are often associated with

⁸ Despite their malevolent reputation, some stories depict individual Fomoire in a more sympathetic light, portraying them as complex characters with their own desires and motivations. In some accounts, Fomoire are depicted as skilled craftsmen and warriors, capable of great feats of strength and magic.

⁹ Sometimes interpreted as fallen angels, i.e., demons.

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themes of divine punishment and corruption, as their existence is seen as a perversion of the natural order.

Oni-Human Hybrids: In Japanese folklore, oni are malevolent spirits or demons often depicted as large, ogre-like creatures with horns and wild hair. Sometimes, stories feature oni-human hybrids, typically resulting from unions between an oni and a human. These hybrids may inherit some of the oni's physical traits, such as horns or strength, as well as their mischievous or malicious nature.

These are just a few examples, and there are many other variations of partially demon and partially human beings found in mythologies around the world. They often serve as compelling figures in storytelling, embodying themes of the struggle between good and evil, the supernatural and the mundane, and the complexities of identity and heritage.

Cambions: A Hybrid of Demon and Human

Human imagination has conjured a plethora of mythical beings, among which *cambions* hold a particularly intriguing place. The concept of cambions finds its roots in Western European folklore, particularly within the framework of Christian demonology.¹⁰ Cambions are creatures born of the union between a demon and a human, embodying a unique blend of the supernatural and the mortal. These unions are typically portrayed as acts of seduction, coercion, or temptation, reflecting broader themes of moral ambiguity and the struggle between good and evil. [Cambion]

The characteristics attributed to cambions vary across different mythological traditions, but they commonly possess a blend of supernatural powers and human vulnerabilities, with physical traits reminiscent of their demonic parentage, such as horns, fangs, or unnaturally colored eyes, but mostly possessing supernatural abilities, including shapeshifting, telepathy, or control over dark magic. In addition to their supernatural powers, cambions are often portrayed having charismatic and seductive demeanors, using their allure to manipulate and deceive mortals. This aspect of their character reflects themes of temptation and moral corruption, as cambions — neither fully human nor purely demonic — navigate the complexities of their dual heritage.

¹⁰ The word “cambion” is believed to derive from the Late Latin term “cambuca,” which referred to a vessel used by Roman soldiers. Over time, it evolved to denote a vessel or receptacle for spirits, eventually coming to signify the offspring of demons.

Merlin, the legendary wizard from Arthurian mythology, is sometimes depicted as a cambion.¹¹

According to some versions of the tale, Merlin's father was an incubus who seduced his mother, a mortal woman. This union resulted in Merlin's birth, granting him his magical abilities.

In William Shakespeare's play "The Tempest," *Caliban* is a half-human, half-demon creature who serves as one of the primary antagonists. While the exact nature of Caliban's parentage is not explicitly stated in the play, his origins are described as being monstrous and unnatural. Caliban's character embodies themes of colonization, power dynamics, and the clash between civilization and the wild.

As hybrid beings, cambions occupy a liminal space between the supernatural and the mortal. In Christian demonology, cambions are often viewed as embodiments of sin and moral decay, reflecting the consequences of succumbing to worldly desires. They serve as cautionary figures, warning against the dangers of indulgence and spiritual corruption.

Hybrid Giants and Divine Judgment: The Tale of the Nephilim

The *nephilim*¹² are mentioned in ancient texts such as the Bible and various apocryphal works [Barker], are shrouded in mystery and controversy, occupying a unique place in the tapestry of mythological lore, embodying themes of hybridity, rebellion, and divine judgment.

The nephilim are mentioned specifically in Genesis,¹³ where they are described as the offspring of unions between "the sons of God" and "the daughters of men."¹⁴

In some interpretations, they are depicted as literal giants, possessing immense size and strength. Other sources describe them as beings of great wickedness or spiritual corruption, whose presence on Earth threatened the order established by God.

According to the biblical narrative, the presence of the nephilim on Earth prompted divine intervention, leading to the Great Flood as a means

¹¹ The story of Merlin as a cambion is explored in various medieval texts, including Geoffrey of Monmouth's *Historia Regum Britanniae*.

¹² The term "Nephilim" is derived from the Hebrew word "nephiyil," which translates to "giants" or "fallen ones."

¹³ The Holy Bible: Genesis 6:1-4.

¹⁴ Their precise identity is a subject of debate among scholars, with interpretations ranging from fallen angels to divine beings or rulers.

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of cleansing the world of their corruption. Only Noah and his family were spared, as they were deemed righteous in the eyes of God. The story of the Nephilim serves as a cautionary tale about the consequences of moral corruption and divine judgment.

Two representative characters are:

Goliath, the legendary giant from the biblical story of David and Goliath,¹⁵ is often interpreted as a Nephilim or descendant of the Nephilim. Goliath is described in the biblical text as a giant, towering over his opponents with his imposing stature. His armor alone is said to have weighed hundreds of shekels of bronze, underscoring his formidable presence on the battlefield.

Og, the king of Bashan, is a figure mentioned in the Hebrew Bible, specifically in the Old Testament. According to the biblical narrative, Og was one of the last remaining Rephaites, a group of giants who were known for their great stature and strength. The Rephaites were believed to be an ancient race of people who inhabited the land of Canaan before the Israelites arrived. Og's defeat is recounted as one of the victories achieved by the Israelites under the leadership of Moses.¹⁶ [Nephilim]

The story of the nephilim has left a lasting impact on religious and cultural narratives throughout history. In Jewish and Christian traditions, they are often interpreted as symbols of rebellion, sin, and divine judgment, serving as cautionary figures, warning against the dangers of pride, corruption, and moral decay.

Oni-Human Hybrids: Intersections of Humanity and Demonology in Japanese Folklore

In Japanese folklore, the *oni* are formidable and malevolent spirits or demons known for their monstrous appearance and malicious behavior. Often depicted as horned, ogre-like creatures with wild hair and fearsome expressions, oni embody the darker aspects of the supernatural realm.

Oni-human hybrids represent a multifaceted archetype within Japanese folklore. Born from the union of humanity and demonology, these hybrids embody themes of power, temptation, and the moral transgressions.

¹⁵ The Holy Bible: Samuel 1:17.

¹⁶ The book of Deuteronomy provides further details about Og and his kingdom. In Deuteronomy 3:11, it is mentioned that Og's bed was made of iron and was more than thirteen feet long and six feet wide, indicating his enormous size.

Their role as malevolent spirits capable of wreaking havoc upon humans reflects broader cultural anxieties surrounding the forces of darkness and chaos.

Oni-human hybrids, sometimes referred to as “half-oni” or “oni-kijo,” inherit traits from both their demonic and human heritage. They may possess the physical characteristics of oni, such as horns, fangs, and exaggerated features, while also retaining elements of their human ancestry. These hybrids are often depicted as powerful and fearsome beings, capable of both great strength and cunning intelligence. Despite their monstrous appearance, oni-human hybrids may exhibit complex emotions and motivations.

Two representative characters are:

Shuten-doji is a legendary oni king who terrorized the ancient capital of Kyoto. According to folklore, Shuten-doji was believed to be a half-oni, born from the union between a human woman and the king of the oni. [Shuten]

Ibaraki-doji is a female oni who is often depicted as a vengeful spirit seeking retribution for past injustices. [Ibaraki]

These and other oni-human hybrids populate the Japanese mythology, embodying themes of power, vengeance, and the struggle between humanity and the supernatural. From traditional folk tales and kabuki theater to modern manga and anime, oni-human hybrids remain enduring symbols of the supernatural and the fantastic. Their stories serve as cautionary tales, reminding audiences of the dangers of succumbing to temptation and the importance of moral integrity in the face of adversity.

Transcending Species: Part Human + Part Animal Hybrids

Part-human, part-animal mythological hybrids have fascinated cultures throughout history, appearing in myths, legends, and folklore around the world. These hybrids embody a fusion of human and animal traits, blurring the boundaries between the human and non-human realms. Here are some common examples of such hybrids:

The Egyptian god *Anubis*, depicted with the body of a man and the head of a jackal, serves as a guide and protector of the dead, symbolizing the transition between life and death.

In Greek mythology, the Centaur is a creature with the upper body of a human and the lower body of a horse. Centaurs are often depicted as possessing superhuman strength and agility, as well as a wild and untamed

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nature. They are associated with Dionysus, the god of wine and revelry, and are often depicted as participants in his ecstatic rites and celebrations.

〔Centaur〕 The *Minotaur*, another creature from Greek mythology, possesses the body of a human and the head of a bull. Confined within the labyrinth of Crete, the Minotaur symbolizes brute strength, primal aggression, and the darker aspects of human nature. 〔Minotaur〕

In Greek and Roman mythology, the *Harpy* is a creature with the body of a bird and the head of a woman. Often depicted as fierce and predatory, harpies symbolize chaos, violence, and the destructive forces of nature.

〔Harpy〕

Found in various cultures worldwide, the *werewolf* is a creature that can transform from human to wolf form, often associated with themes of lycanthropy and shapeshifting.

〔Werewolf〕 *Mermaids* and *mermen*, creatures with the upper body of a human and the lower body of a fish, appear in folklore and mythology from cultures around the world. They are often associated with the sea, symbolizing mystery, allure, and the unknown depths of the ocean.

〔Mermaid〕

These part-human, part-animal hybrids serve as powerful symbols in mythology, representing a wide range of themes including the relationship between humanity and nature, the complexity of human identity, and the struggle between civilization and the primal instincts.

The Winged Man: Part Human + Part Bird Hybrids

The motif of the winged man, a figure with both human and avian characteristics, has appeared in various forms throughout mythology, folklore, and art across different cultures. This hybrid creature often symbolizes a fusion of earthly and celestial elements, embodying themes of freedom, transcendence, and the duality of human nature.

Let us explore the motif of the winged man in different cultural contexts, noting that some of them can be classified as SuperHybrids as well due to their associated divine nature:

Garuda is a divine being in Hindu mythology, often depicted with a human upper body and wings, while the lower body resembles an eagle or bird. As the mount of the god Vishnu, Garuda symbolizes power, strength, and the ability to soar to great heights.

Horus (Egyptian Mythology), the god of the sky and kingship, is sometimes depicted with the head of a falcon and the body of a man.

Icarus (Greek Mythology) is perhaps the most iconic representation of the winged man.

Alongside his father Daedalus, Icarus escapes imprisonment using wings crafted from feathers and wax. However, his disobedience leads to his tragic downfall as he flies too close to the sun, melting the wax and causing him to fall.

Eros/Cupid (Greco-Roman Mythology): the Greek god of love, and his Roman counterpart Cupid, are occasionally portrayed with wings. This representation aligns with their association with the flighty and unpredictable nature of love.

Phoenix (Various Cultures), while not a traditional winged man, the mythical bird that cyclically regenerates or reborn is sometimes depicted with human-like characteristics, especially in art and literature.

Fenghuang (Chinese Mythology), also known as the Chinese phoenix, is a mythical bird with a mix of avian and human features. Often considered a symbol of harmony and balance, the Fenghuang embodies the union of opposites.

Angels (Various Cultures), are often depicted as winged beings with a human-like appearance. In Christianity, angels are messengers of God, and artistic representations frequently portray them with wings, symbolizing their celestial nature.

Shangó (Yoruba Mythology), the god of thunder and lightning, is sometimes depicted with wings. The wings emphasize his connection to the sky and his ability to move swiftly across the heavens. The motif of the winged man resonates across cultures, illustrating humanity's fascination with the idea of transcending earthly limitations and reaching for higher realms. Whether representing divine messengers, mythical heroes, or symbolic creatures, the winged man motif captivated the human imagination and conveyed universal themes of aspiration and transcendence.

Gods and Beasts: Part God + Part Animal Hybrids

The concept of beings that are partially god and partially animal, with no human attributes or representations, is less common in mythology and folklore compared to those with human-like characteristics. However, there are still some examples from various cultural traditions around the world where such beings are found. These creatures often embody a unique blend of divine and animalistic qualities, serving as symbols of power, transformation. Here are a few examples:

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Azure Dragon: In Chinese mythology, the Azure Dragon is one of the four celestial guardians, representing the east and the spring season. The Azure Dragon is sometimes depicted as a SuperHybrid, a dragon with the body of a snake and the claws of a tiger, symbolizing power, vitality, and the cosmic forces of nature. He is associated with the element of wood and serves as a protector of the heavens.

Pegasus: In Greek mythology, Pegasus is a divine winged horse,¹⁷ born from the blood of the Gorgon Medusa after she was slain by the hero Perseus. He is associated with the god Poseidon and serves as a mount for heroes such as Bellerophon.

In Norse mythology, *Fenrir* is a monstrous wolf, the offspring of the god Loki and the giantess Angrboða. Fenrir is depicted as a fearsome and powerful creature, destined to bring about the end of the world during Ragnarok.

Thunderbird: In Native American mythology, the Thunderbird is a powerful and mythical bird, often depicted as a large bird of prey with the wingspan of an eagle and the feathers of a hawk or owl. The Thunderbird is associated with thunderstorms, lightning, and the forces of the sky, serving as a symbol of power, transformation, and the spiritual connection between humans and nature.

These examples illustrate the diverse range of beings that embody the concept of entities partially god and partially animal, with no human attributes or representations, in mythology and folklore, serving as symbols of divine power, guardianship, or natural forces.

The Mystical Azure Dragon: A Chinese Celestial Guardian

The Azure Dragon, known as *Qinglong* in Chinese, is one of the four celestial guardians in Chinese mythology, along with the Vermilion Bird, the White Tiger, and the Black Tortoise. It is often depicted as a dragon with the body of a snake and the claws of a tiger, symbolizing the convergence of different animal attributes, in such case categorized as a SuperHybrid entity. The Azure Dragon is associated with the element of wood, the direction of east, and the season of spring, representing vitality, growth, and renewal. [Azure]

¹⁷ Pegasus is often depicted as a majestic white horse with wings, symbolizing swiftness, freedom, and the divine realm. While Pegasus is not a deity himself, he is closely associated with the gods, particularly Zeus, the king of the gods, and Athena, the goddess of wisdom and war.

The Azure Dragon holds profound cultural and symbolic significance in Chinese mythology and society, serving as a protector of the heavens and a symbol of imperial power and authority.¹⁸ It is closely associated with the Emperor of China and the concept of the Mandate of Heaven, representing the divine sanction of rulership and the cosmic order of the universe.

Through its hybrid form and multifaceted attributes, it invites contemplation of the neutrosophic principles of ambiguity, uncertainty, and indeterminacy. As a symbol of neutrosophic balance, the Azure Dragon navigates the complexities of existence, embodying the cyclical rhythms of nature and the interconnectedness of all living beings.

Thunderbird: A Native American Mythical Entity

In the Native American mythology, including the Ojibwe, Lakota, and Haida peoples, the *Thunderbird* emerges as a powerful and enigmatic symbol of the natural world and spiritual realms. Representing thunderstorms, lightning, and the forces of the sky, this mythical creature embodies the dynamic interplay between earthly and celestial forces.

It is often depicted as a large bird of prey, resembling an eagle or hawk, with wings spanning the heavens and feathers crackling with lightning. The Thunderbird is associated with thunderstorms, lightning, and the life-giving rains that nourish the earth. Its powerful presence symbolizes the awesome and unpredictable forces of nature. [Thunderbird]

It is a benevolent and awe-inspiring creature, bringing blessings of rain and prosperity to the land. In the traditions of the Ojibwe and other tribes, the Thunderbird is believed to inhabit the highest mountains and cliffs, from which it watches over the earth and sends forth lightning and thunder to cleanse and purify the land. Ceremonial dances and songs are performed to honor the Thunderbird and invoke its protection and guidance.¹⁹

¹⁸ In Chinese mythology and folklore, the Azure Dragon is celebrated in various legends, rituals, and festivals. It is often depicted as a guardian deity, protecting sacred sites such as temples, palaces, and ancestral tombs. During the Qingming Festival (Tomb-Sweeping Day), offerings are made to the Azure Dragon to honor ancestors and seek blessings for the coming year. In art and literature, the Azure Dragon is depicted as a symbol of strength, resilience, and celestial beauty, inspiring awe and reverence among the Chinese people for centuries.

¹⁹ The Thunderbird holds profound cultural and symbolic significance in Native American mythology and spirituality, serving as a guardian of the natural world and a messenger of the gods. It is closely associated with rituals, ceremonies, and traditions related to rainmaking, agriculture, and hunting. The

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Therefore, the Thunderbird embodies the mysteries of the natural world and spiritual realms in Native American mythology. As a symbol of divine power and natural forces, the Thunderbird constitutes a timeless reminder of the interconnectedness of worlds and the cyclical rhythms of nature.

Wings of Ambiguity: Pegasus

In the vast expanse of Greek mythology, *Pegasus* emerges as a symbol of boundless freedom, transcending the earthly realm with his majestic wings and divine grace. According to legend, Pegasus emerged from the blood of the slain Gorgon Medusa, born of the union between the earth and the sea. With his pristine white coat and wings of pure light, Pegasus embodies the ideal of divine beauty and grace. He is often depicted as a symbol of inspiration, carrying the thunderbolts of Zeus or the muses of Mount Helicon on his celestial journeys.²⁰ [Pegasus]

Pegasus, typically portrayed as a magnificent winged horse, embodies the mysteries of divine beauty and transcendence. Through his hybrid form and multifaceted attributes, he invites contemplation of the neutrosophic principles.

Mythical MultiAlist Entities:

Part God + Part Human + Part Animal SuperHybrids

These hybrid creatures embody a complex blend of divine, mortal, and animalistic attributes, serving —in mythologists' opinion— as symbols of transformation, power, and the interconnection between different realms of existence. Here are some examples from different mythologies:

In Egyptian mythology, *Thoth* is often depicted as a deity with the body of a human and the head of an ibis or a baboon. As the god of wisdom, writing, and magic, Thoth embodies the divine intellect and creative power of the gods, while also possessing human-like qualities such as intelligence and

Thunderbird is revered as a protector of the tribe and a symbol of strength, resilience, and spiritual renewal. Its presence in Native American art, dance, and oral traditions reflects the enduring reverence and awe inspired by this mythical creature.

²⁰ Pegasus holds profound cultural and symbolic significance in Greek mythology and society, serving as a symbol of divine inspiration, creativity, and transcendence. He is closely associated with the muses of Mount Helicon, who were said to have nurtured him with the waters of the Pierian Spring. Pegasus is also linked to the hero Bellerophon, whom he aided in his quest to slay the monstrous Chimera. Through his mythic adventures and legendary feats, Pegasus continues to inspire artists, poets, and dreamers to reach for the stars and pursue their loftiest aspirations.

compassion. His hybrid form symbolizes the synthesis of divine knowledge and mortal understanding, serving as a guide and mediator between gods and humans. [Thoth]

In Hindu mythology, *Hanuman* is a deity with the body of a human, but a monkey face, and the intelligence and powers of a god. He is revered as the devoted companion of Lord Rama and a symbol of strength, courage, and devotion. Hanuman's hybrid nature reflects his divine lineage as the son of the wind god Vayu and a celestial nymph, as well as his close association with the natural world and the animal kingdom.²¹ [Hanuman]

In Japanese folklore, *Tengu* are kite-like beings taking a human-like form, but retaining avian wings, heads, or beaks, and endowed with the intelligence and powers of a god. Tengu are associated with mountains and forests, where they serve as guardians and tricksters, testing the virtues of travelers and monks. [Tengu]

These cases highlight the diverse range of beings that embody the concept of being partially god, partially human, and partially animal in mythology and folklore, thus being associated with multialistic features [MultiAlist]. In a neutrosophic context, such beings represent the inherent ambiguity and paradoxical nature of existence, existing in a state of *both-and*, rather than *either-or*.

The Sphinx: The Egyptian Guardian

In the timeless sands of Egyptian mythology and history, the Sphinx stands as a testament to the enigmatic blending of human and animal attributes, endowed with divine powers. Carved from the living rock, this iconic creature embodies a profound symbolism, serving as a guardian of knowledge, mystery, and cosmic balance.

The Sphinx finds its origins in the ancient Egyptian concept of the “shesep ankh,” or “living image.” It is typically depicted as a recumbent lion with a human head, often bearing the likeness of a pharaoh. This hybrid form symbolizes the union of divine kingship (represented by the lion) with human intelligence and wisdom (embodied by the human head). The Sphinx serves as a guardian of sacred spaces, such as the entrance to temples or the avenues

²¹ Hanuman is depicted with five faces, symbolizing his divine power and illustrating a narrative from one of his tales. In an episode where he aids Rama (specifically, rescuing Rama from the demon Ahiravana, Ravana's brother), Hanuman needed to extinguish five lamps simultaneously to defeat Ahiravana. To accomplish this task, he manifested five heads, each facing a different direction where the lamps were located.

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leading to royal tombs, as well as a protector of cosmic order and the cycle of life and death.²² [Sphinx]

Mythic Meld: The Intersection of Gods, Humans, and Animals in Hindu mythology

The concept of multialist hybrids —beings that are partially god, partially human, and partially animal—, is richly depicted in various tales and legends of Hindu mythology. These hybrid entities embody the intricate interplay between the divine, human, and animal realms, thus offering another neutrosophic context.

One prominent example of such hybrid in Hindu mythology is *Hanuman*, the monkey-faced deity known for his unwavering devotion to Lord Rama. Hanuman is revered as the epitome of loyalty, strength, and courage, possessing divine attributes as well as animalistic traits. His physical appearance, with a human body adorned with a monkey's face and tail, reflects his multialistic nature as both a divine being and a mixed creature of the natural world.

Another multialist hybrid is *Narasimha*, the half-man, half-lion incarnation of Lord Vishnu. According to Hindu mythology, Narasimha emerged to protect his devotee Prahlada from his tyrannical father, the demon king Hiranyakashipu. With the body of a man and the head and claws of a lion, Narasimha embodies the ferocity and power of the animal kingdom, combined with the intellect and compassion of humanity. [Narasimha]

In a neutrosophic context, these multi-alist hybrids challenge conventional notions of identity and categorization, existing at the intersection of multiple domains of existence. They embody the paradoxical nature of reality, simultaneously embodying divine, human, and animal attributes, transcending binary distinctions and embracing the multialist possibilities of the universe.

Centzon Totochtin: Aztec Rabbit Deities

In the vibrant tapestry of Aztec mythology, the *Centzon Totochtin* stand as enigmatic figures, embodying the complex interplay between divine,

²² The Sphinx is closely associated with the god Atum-Ra, the sun god and creator deity. One famous example is the Great Sphinx of Giza, which stands in front of the Pyramid of Khafre and is believed to embody the pharaoh himself, serving as his eternal protector and guide in the afterlife. Another example is the Sphinx of Amenemhat II, which guards the entrance to the temple of the god Amun-Ra at Tanis.

human and animal realms. Translating to “Four Hundred Rabbits”²³ in Nahuatl, the language of the Aztecs, these divine rabbit represents fertility, abundance, and the celebration of life. The Centzon Totochtin trace their origins to the union of the goddess Mayahuel, the deity of maguey plants, and the god Patecatl, the deity of pulque.

The 400 gods are often depicted as humanoid figures with rabbit-like features, such as long ears, whiskers, and sometimes a fluffy tail. [Centzon]

One notable example is the rabbit deity *Ometotchtli*, who presides over drunkenness and revelry, embodying the festive spirit of Aztec culture.²⁴ Another example is *Tepoztecatl*, the rabbit god of pulque, who oversees the fermentation and consumption of the sacred beverage.

Remarks & Open Questions

Hybrid Beasts and SuperHybrid Beasts:

Part Animal₁ + Part Animal₂ (+ ... + Part Animal_n) Hybrids

Hybrid Beasts and SuperHybrid Beasts are fantastical creatures with a combination of features from different animals, abounding in folklore and mythology across cultures. Here are some examples of such beasts:

Anzû (Sumerian Mythology) is a divine storm bird, often depicted as an eagle with a lion's head.

It is associated with the heavens and sometimes considered a symbol of chaos.

Ammit (Egyptian Mythology), also known as the “Devourer of the Dead,” is a creature with the head of a crocodile, the forelimbs of a lion, and

²³ In Aztec culture, the number 400 held significant symbolism, particularly in relation to time and calendrical systems. The Aztecs used a complex calendar system composed of several interlocking cycles, one of which was the “xiuhpohualli,” or the agricultural calendar, which consisted of 18 months of 20 days each, plus an additional 5 “unlucky days” at the end. The number 400 is relevant because it corresponds to the length of one “xiuhpohualli” cycle, which is comprised of 20 “veintenas” (cycles of 20 days), each lasting 20 days. When multiplied together, 20 veintenas x 20 days = 400 days. After completing one cycle of 400 days, the calendar would restart, beginning a new cycle. This cyclical nature of time represented by the number 400 was significant in Aztec cosmology and rituals, as it reflected the continuous cycle of life, death, and rebirth observed in the natural world. Additionally, the number 400 was associated with concepts of completion, renewal, and the cyclical nature of existence in Aztec belief systems.

²⁴ They participate in festive celebrations, such as the Huey Tozoztli festival, where offerings of food, drink, and flowers are made in their honor. The legacy of the Centzon Totochtin continues to resonate in Mexican culture today, where rabbits are revered as symbols of fertility, abundance, and the renewal of life.

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the hind limbs of a hippopotamus. It is said to devour the hearts of the unworthy during the judgment of the dead.

Chimera (Greek Mythology) is a fire-breathing SuperHybrid monster with the body of a lion, the head of a goat, and a serpent's tail.

Griffin (Various Cultures) is a legendary creature with the body of a lion and the head of an eagle, often associated with guarding treasures.

Hippogriff (European Mythology) is a legendary creature with the front half of an eagle and the hind half of a horse.

Qilin (Chinese Mythology) is a mythical creature with the body of a deer, tail of an ox, hooves of a horse, and sometimes features like a dragon or lion.

Baku (Japanese Mythology) is a supernatural creature that is part elephant, part lion, and part tiger. It is believed to devour nightmares.

Nue (Japanese Folklore) is a chimera-like creature, featuring the head of a monkey, the body of a tanuki (raccoon dog), the limbs of a tiger, and a snake for a tail. It is associated with ill omens. *Camahueto* (Mapuche Mythology, South America) is a creature with the body of a calf and a spiral-shaped horn. It is considered a powerful and sacred being.

Jackalope (North American Modern Folklore) is a whimsical creature with the body of a jackrabbit and antlers like those of an antelope or deer. It is a product of American tall tales.

These creatures often embody the blending of different species and frequently serve as symbols, metaphors, or explanations for natural phenomena, embodying cultural beliefs and values.

Hybrids and SuperHybrids in Art & Fiction

The fascination with hybrids and superhybrids permeates various forms of art and fiction, captivating audiences across cultures and genres. From classical paintings to contemporary literature, these fantastical beings have seized the imagination of creators and audiences alike, transcending boundaries of time and medium.

In the realm of visual arts, depictions of hybrids and superhybrids have adorned canvases for centuries, often serving as symbols of the extraordinary and the otherworldly. Artists throughout history have been drawn to the concept of merging disparate elements from the natural world to create creatures that defy conventional classification. Whether it's the centaurs of Greek mythology, the sphinxes of ancient Egypt, or the futuristic

cyborgs of science fiction, artists have explored the boundaries of imagination through their portrayals of these hybrid beings.

Similarly, in the world of literature and fiction, hybrids and superhybrids have emerged as popular subjects, enriching narratives with their complex characters and fantastical worlds. From ancient myths and legends to modern-day novels and comics, these beings inhabit stories that explore themes of identity, transformation, and the interplay between humanity and the unknown. Whether they're portrayed as heroes, villains, or something in between, hybrids and superhybrids challenge readers to question the nature of existence and the limits of imagination.

For example, *Pegasus*, the majestic winged horse of Greek mythology, occupies a prominent place in the collective imagination, celebrated across numerous legends, tales, and artistic renderings throughout history, from ancient vase paintings to modern-day literature. These artistic depictions often portrayed him in full flight, his powerful wings outstretched as he soared through the heavens, e.g. the mosaic of Pegasus found at the House of Dionysus in Paphos, Cyprus. In this mosaic, Pegasus is depicted with stunning detail and elegance, carrying the muses on his back as he ascends into the sky. In addition to visual art, Pegasus has left an indelible mark on literature, inspiring some of the greatest poets and writers of antiquity. In the epic works of Homer, Hesiod, and Pindar, Pegasus is celebrated for his mythic beauty, grace, and divine lineage.

In literature, the concept of the *homunculus* has been reimagined and adapted in various ways. It has appeared in works of fiction, such as Mary Shelley's "Frankenstein" where the scientist Victor Frankenstein creates a humanoid creature through scientific experimentation. Similarly, in Johann Wolfgang von Goethe's "Faust," the character of Faust conjures a homunculus through magical means.

In modern literature, film, and popular culture, *cambions* continue to captivate audiences with their enigmatic allure and complex motivations. From Anne Rice's "The Witching Hour" to the television series "Supernatural," created by Eric Kripke, cambions have been reimagined and reinvented, each iteration offering new insights into their mythological origins and cultural significance.

The *Tuatha Dé Danann* and *Fomoire* have left a lasting impact on Irish culture and folklore. Their stories and legends continue to be celebrated in literature, art, and popular culture. Many landmarks and geographical features in Ireland are associated with these mythical beings, contributing to

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the cultural landscape of the country. The novel “A Portrait of the Artist as a Young Man” by James Joyce includes references to these entities. Also, the novel “An Only Child” by Frank O’Connor features such elements of Celtic folklore and mythology, and the same in “American Gods” by Neil Gaiman. The animated film “The Secret of Kells”, directed by Tomm Moore and Nora Twomey, draws inspiration from the same mythological aspects. The character Hellboy in “Hellboy” comic series by Mike Mignola encounters creatures inspired by Celtic mythology. And so forth.

In today’s digital age, the popularity of hybrids and superhybrids shows no signs of waning. They continue to inspire artists, writers, filmmakers, and creators across various mediums, fueling a creative renaissance that pushes the boundaries of storytelling and artistic expression.

Certainly, contemporary writers and artists possess the creative potential to craft a diverse array of Hybrids and SuperHybrids, leveraging modern tools such as generative artificial intelligence to push the boundaries of imagination.

One intriguing possibility lies in the creation of novel beings that blend elements from disparate realms, such as the envisioned God-Human-Demon SuperHybrid. This entity embodies a fusion of divine, human, and demonic attributes, offering a complex and multifaceted character ripe for exploration in both fictional narratives and visual art. Moreover, artists and writers can employ varying degrees of composition to construct these imaginative entities, allowing for a nuanced approach to their creation. For instance, one could specify the proportions of each constituent component, delineating the precise makeup of the hybrid being. This approach introduces a level of granularity and specificity, enabling creators to tailor the characteristics of their creations according to their artistic vision. For example, a hypothetical hybrid might be described as 30% Demigod, 47% Demon, 3% Cambion, 15% Animal, and 5% Human. Each percentage represents a distinct aspect of the hybrid’s nature, contributing to its overall identity and narrative significance. Through this detailed approach, creators can imbue their creations with depth and complexity, inviting audiences to contemplate the interplay of different forces and identities within these fantastical beings.

In essence, the creative possibilities afforded by contemporary tools and techniques enable artists and writers to explore new frontiers in the realm of mythology and fantasy. By harnessing the power of imagination and innovation, they can breathe life into a diverse cast of characters. Through experimentation with the new AI tools, Hybrids and SuperHybrids will continue to evolve.

'Mythological Teratology' and Open Questions

Teratology²⁵ has traversed a fascinating journey through history, evolving from a discourse on prodigies and marvels to a scientific field that explores congenital malformations and their causes. This interdisciplinary realm intersects with developmental biology, embryology, and genetics, delving into the study of abnormalities in physiological development. In the modern context, teratology encompasses the medical examination of teratogenesis, congenital malformations, and individuals with significant malformations. The principles of teratogenesis provide a foundational framework for understanding the effects of environmental agents on developing organisms. These principles consider factors such as genotype, exposure timing, and environmental interactions, guiding research in teratogenic agents.

However, the roots of teratology extend deep into antiquity, where figures like Phlegon of Tralles, a prominent paradoxographer from the first and second centuries CE, meticulously chronicled extraordinary narratives in his magnum opus, "Peri thaumasion" ("Book of Wonders") [Hatzopoulos]. Phlegon's accounts, along with those of Pliny the Elder and other ancient scholars, offer glimpses into a world where anomalies were observed with a blend of astonishment and intellectual curiosity. Immersing oneself in Phlegon's narratives offers a journey into a realm where anomalies are not merely observed but chronicled, encompassing accounts of hermaphrodites, individuals undergoing sex transformations, and instances of unusual births. [Nutton] Accounts from travelers as documented in the *Natural History* of Pliny the Elder further elaborate on the existence of fantastical beings in distant lands, such as individuals with a dog's head resembling baboons, those with a single tall foot (sciapodes), or beings with faces embedded in their chests (referred to as acephala).

Ancient narratives often described individuals with anatomical anomalies, such as hermaphrodites or individuals lacking mouths or noses. These accounts, along with the tapestry of mythical monsters found in global folklore, including giants, cyclops, centaurs, and so forth, raise intriguing questions about the relationship between medical abnormalities and mythical creatures.

²⁵ Originating from the Greek word “τέρας” meaning “sign sent by the gods, portent, marvel, monster”.

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Could ancient accounts of marvels and hybrids have emerged as reflections of medical abnormalities? Could modern teratology provide insights into the emergence and perpetuation of mythical monsters? The concept of "Mythological Teratology" arises as a prospective pathway for exploring this intersection between myth and reality, bridging the gap between ancient lore and modern science.

Utilizing generative artificial intelligence to compare current knowledge on malformations with mythical Hybrids and SuperHybrids opens new avenues for research and exploration. By delving into this mixed study, researchers may uncover insights into the origins of mythical creatures and gain a deeper understanding of the intricate relationship between myth and reality.

Exploring the Intricacies of Heredity: Attributing Divine Paternity and Other Open Questions

Investigating the hereditary lineage of hybrid beings throughout diverse historical periods and cultural contexts unveils a fluid and intriguing terrain, prompting some bold inquiries that may challenge conventional notions.

As previously emphasized, in Greek mythology, divine paternity is a recurrent theme, exemplified by the numerous instances of gods fathering demigods with mortal women. Zeus, the king of the gods, is particularly renowned for his amorous escapades with mortals, leading to the birth of heroes like Hercules, Perseus, and Helen of Troy. These demigods inherit traits and abilities from their divine fathers, creating a neutrosophic blend of mortal and divine characteristics.

Similarly, in Roman mythology, the god Mars is considered the divine father of Romulus and Remus, the legendary founders of Rome.²⁶ This divine paternity adds a sacred dimension to the origin of the Roman civilization, emphasizing the divine guidance and protection bestowed upon the city through its founding figures.

In Hinduism, the concept of divine paternity is embodied in stories from the ancient scriptures. For instance, Lord Rama, a revered deity, is

²⁶ As mentioned in Livy's *History*, Rhea Silvia claimed that Mars was the father of her twins. Attributing divine paternity was not new. Alcmene, the mother of Heracles (Hercules), attributed the paternity of her son to Zeus. According to the myth, Zeus disguised himself as Alcmene's husband, Amphitryon, leading to the birth of the heroic demigod Heracles. Danaë, the mother of Perseus, claimed that Zeus impregnated her in the form of a shower of gold. Semele, mother of Dionysus, insisted that Zeus was the father of her child. The god revealed his true form to her, but the divine radiance proved too much for Semele, leading to her demise. And so on.

believed to be the son of King Dasharatha and the result of divine intervention. Lord Krishna, another significant deity in Hinduism, is said to be born to mortal parents but with a divine purpose, emphasizing the divine's direct involvement in human affairs.

Ancient Egyptian mythology also features the concept of divine paternity, with stories of pharaohs being considered divine descendants of gods. The pharaohs were believed to be the offspring of deities like Ra or Osiris, highlighting their divine right to rule and connecting the earthly and divine realms.

The concept of divine paternity is not confined to classical mythologies; it also finds expression in indigenous beliefs and modern religions. In Native American cultures, for instance, there are stories of gods or spirits fathering heroes or important figures. Christianity, with its foundational story of the Virgin Mary conceiving Jesus through the Holy Spirit, embodies a unique form of divine paternity. Jesus is considered the Son of God, and this divine parentage holds profound theological significance within Christian doctrine. In each cultural context, the concept of divine paternity serves various purposes. It can explain the extraordinary qualities or destinies of certain individuals, reinforce the divine connection between gods and humans, or legitimize the rule of certain lineages. While the specifics vary, the overarching theme remains a fascinating exploration of the intersection between 'non-natural' and 'natural' beings, shaping cultural narratives, religious beliefs, and societal structures across diverse civilizations. On the other hand, in the play "Eumenides" by Aeschylus, the god Apollo claims the father's share in heredity is 100%, reflecting an ancient belief in paternal dominance. Aeschines tells of the Amphictyons who cursed perpetrators of sacrilege by wishing upon them the birth of children that do not resemble their parents, but monsters.

To look at other aspects as well, in the southwestern state of Kerala in India, matrilineal communities coexist until nowadays with the prevalent patrilineal system. Lineage and inheritance are traced through the female line, challenging the notion of a standardized understanding of heredity within the same cultural and national context. The Mosuo people, a small ethnic group in China, practice as well a form of matrilineal society where lineage and family property are passed down through the female line. The absence of formal marriages adds another layer to their cultural variation, challenging the notion of a standardized understanding of heredity prevalent in ancient times.

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In Laurence Sterne's "Tristram Shandy," there is a mockery of the homunculus theory, emphasizing the lack of empirical knowledge and the speculative nature of theories regarding the transmission of traits from parent to offspring. The evolution of scientific knowledge, including the discovery of chromosomes, meiosis, and fertilization, has significantly transformed our understanding of heredity.

Advancements in genomics have revealed that modern humans carry a (neutrosophic) percentage of their DNA inherited from Neanderthals, suggesting interbreeding between the two species. This genetic legacy is embedded in the DNA of contemporary humans, offering a tangible link to a shared ancestry that extends beyond the *Homo sapiens* lineage.

I wonder if this interbreeding has left traces in the collective memory. A navigation to the intricate interplay of neutrosophic elements within the realms of mythology —e.g. the hybridization between 'non-natural' beings and 'natural' beings, such as 'demigods' and 'cambions'— might share thematic elements reflective of the genetic interbreeding narrative. These hybrid beings often grapple with complex identities, straddling different worlds, and possess extraordinary abilities that set them apart from ordinary humans.

What if the parallel narratives of hybrid beings, with obvious neutrosophic traits, born of 'non-natural'- 'natural' unions, might have served as cultural echoes of our complex ancestry, as a cultural metaphor for the intricate mingling of distinct human species? What if the Neanderthal-Sapiens interbreeding, as well as other humanoid types' interbreeding, substantiated by genetic evidence, is prolonged in folklore, possibly finding a captivating reflection in the mythical realms of hybrid beings and identities? Is it possible for some parallels between scientific discoveries and mythological narratives to underline the enduring human fascination with the mysteries of our origins, and the imaginative ways in which we weave tales to make sense of our genetic heritage?

Toward a Neutrosophic Exploration of Myths

Different cultures perceive Hybrid and SuperHybrid mythological forms in varied ways. From Greek centaurs to Hindu Gandharvas, each mythological tradition contributes unique perspectives on the blending of human and non-human attributes. The symbolism associated with hybrid humans gains depth when analyzed through a neutrosophic lens. Whether viewed as symbols of chaos and monstrosity or as representations of harmony between different realms, the contradictory elements within these beings offer rich material for neutrosophic interpretation. The quest for identity is complex, as these beings navigate their existence on the blurred edges of humanity. These Hybrid and SuperHybrid entities are powerful vehicles for philosophical contemplation and cultural exploration within the framework of neutrosophy.

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The Dynamic Interplay of Opposites in Zoroastrianism

This exploration¹ addresses some aspects of Zoroastrianism, examining how the ancient Persian belief system aligns with the dynamic and indeterminate principles of Fuzzy, Neutrosophic, and MultiAlist systems. Zoroastrianism, rooted in the eternal struggle between good and evil, light and darkness, exhibits parallels with Neutrosophy's acknowledgment of indeterminacy, incompleteness, and dynamic of opposites. Zarathustra's vision of a "neutrosophic" God challenges conventional notions of divine attributes. Before investigating these vague areas, the concept of *unclear conceptual borders* is explored. The law of included infinitely-many-middles suggests that between opposites, there exist infinitely many nuances or middle values. Sorites' paradoxes challenge traditional logic by exposing the difficulties in defining vague boundaries. Neutrosophic Interpretation suggests introducing a buffer zone between opposites, resulting in Neutrosophic Sorites Paradoxes. Moreover, this exploration highlights the need for a more flexible and nuanced understanding of conceptual boundaries, acknowledging the dynamic and indeterminate nature of many philosophical and logical constructs. Finally, I delve into the application of neutrosophy to various cultural and philosophical concepts. The legendary figure of Gilgamesh, described as two-thirds god and one-third human, is examined through both traditional and neutrosophic perspectives. Additionally, Hindu concepts of Dharma, Adharma, and Karma are reexamined within the context of neutrosophy. The logic of the Diamond Sutra in Mahayana Buddhism, characterized by paradoxical language and a focus on emptiness, aligns with neutrosophic principles in challenging fixed notions and embracing the interconnected and indeterminate aspects of reality. Despite diverse cultural origins, these examples share a common thread in questioning absolutes and the dynamic nature of existence.

Zoroastrianism, Zarathustra, Ahura Mazda, Gilgamesh, Dharma, Adharma, Karma, Diamond Sutra, Chinvat bridge, Vagueness, Neutrosophy, Sorites paradoxes, Neutrosophy, Fuzzy, Granulation, MultiAlism.

¹ This is an improved version of the paper: Smarandache, Florentin (2024). "The Dynamic Interplay of Opposites in Zoroastrianism." *Journal of Fuzzy Extension and Applications*, 1:1-5. <https://doi.org/10.22105/jfea.2024.190173.022105>.

Introduction

In two recent articles,² I extended the concepts of ‘pluralism’, ‘neutrosophy’, ‘refined neutrosophy’, ‘refined neutrosophic set’, ‘multineutrosophic set,’ and ‘plithogeny’ [Smarandache 2002, 2013, 2017, 2019, 2021, 2023], into a larger category that I referred to as **MultiAlist**, conceptualizing a **MultiPolar System** formed not only by multiple elements that might beandom, or contradictory, or adjuvant, but also by accepting features from more than one basic system (UniPolar, BiPolar, TriPolar, or PluriPolar systems). One of the illustrations of a MultiPolar system that I proposed in the previously mentioned paper was from the realm of religions, namely *Zoroastrianism*, with its seemingly fuzzy characteristics, which most Western observers find it difficult to categorize as monotheistic, dualistic, or pluralistic.³

In the following, I discuss again some unclear conceptual borders, not before reminding some basics of the theory of fuzzy information granulation and of neutrosophics, as to return to the example of Zoroastrianism for a deeper understanding of some Fuzzy, Neutrosophic, and MultiAlist facets of this religion.

The Fuzzy Information Granulation

Let us first remind the quiddity of the **theory of fuzzy information granulation**, regarded by Zadeh as central in human reasoning [Zadeh 1997]. According to Zadeh, human cognition is based on three fundamental concepts: **granulation** (the division of a whole into pieces), **organization** (the integration of parts into a whole), and **causality** (the association of causes with effects). Granulation of an 'object' generates a cluster of granules of , that are indistinguishable, similar, close together, or functionally related, generally hierarchical in nature, and their attributes and values are fuzzy — since their boundaries are not sharply defined.

² The two articles are: Smarandache, Florentin (2024). “The MultiAlist System of Thought.” *Neutrosophic Sets and Systems* 61, 598-605. https://digitalrepository.unm.edu/nss_journal/vol61/iss1/31; and: Smarandache, Florentin (2023). “Introduction to the MultiNeutrosophic Set.” *Neutrosophic Sets and Systems* 61:89-99. https://digitalrepository.unm.edu/nss_journal/vol61/iss1/6

³ Hintze, A. (2013). “Monotheism the Zoroastrian way.” *Journal of the royal asiatic society*, 24(2), 225–249. DOI: 10.1017/S1356186313000333.

Fuzzy sets

In traditional set theory, an element either belongs to a set or does not. In fuzzy set theory, elements can have partial membership in a set. The membership degree is a value between 0 and 1, where 0 means no membership, 1 means full membership, and values in between indicate partial membership.

Granulation

Granulation involves the grouping or clustering of elements based on their similarity or relevance. It is the process of creating fuzzy sets to represent subsets of elements with similar characteristics. Granulation helps in organizing information and dealing with the inherent imprecision in human knowledge.

Information granules

Information granules are the result of the granulation process. They are fuzzy sets that represent a higher level of abstraction or grouping of elements. These granules make it easier to handle complex and uncertain information by providing a more compact and manageable representation.

Human reasoning

Zadeh argues that human reasoning involves thinking at different levels of granularity.⁴ People naturally organize information into categories or concepts that are not strictly defined but have fuzzy boundaries. Fuzzy information granulation reflects this human cognitive process by allowing for the representation of imprecise and uncertain knowledge.⁵

The Neutrosophics

The Neutrosophy explores the interdependence and interplay of opposites, and challenge traditional binary thinking and offer a nuanced perspective on the complexities of the world. This theory considers every notion or idea $[A]$ together with its opposite or negation $[antiA]$ and with their spectrum of Neutralities $[NeutA]$ in between them (i.e., notions or ideas supporting neither $[A]$ nor $[antiA]$). The $[NeutA]$ and $[antiA]$ together are referred to as $[nonA]$.

⁴ Klir, G. J., & Yuan, B. (1996). "Fuzzy sets, fuzzy logic, and fuzzy systems: selected papers by Lotfi A Zadeh", Vol. 6. World Scientific.

⁵ Yager, R. R., Ovchinnikov, S., & RM, T. (1987). "Coping with the imprecision of real world: an interview with LA Zadeh," p. 436. Wiley.

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Neutrosophy is a generalization of Yin-Yang Ancient Chinese Philosophy and of Hegel's and Marx's Dialectics (which are based on $[A]$ and $[\neg A]$ only). For example, in mathematics, neutrosophic numbers and neutrosophic algebra provide tools for handling uncertainties in numerical data. These concepts find applications in decision-making processes where incomplete or ambiguous information is prevalent. In physics, neutrosophic mechanics extends classical mechanics to account for indeterminate forces and imprecise measurements.

This approach is particularly relevant in quantum mechanics, where the nature of particles and their properties often defy deterministic description.

The philosophical framework

Neutrosophy is a philosophy that acknowledges the existence of indeterminacy in human knowledge and perception. It embraces the idea that many phenomena, concepts, and propositions are neither true nor false but rather exist in a state of partial truth. Neutrosophy introduces the notion of the 'neuter', emphasizing the presence of indeterminacy as a fundamental aspect of reality.

Neutrosophic logic

Neutrosophic logic extends classical logic to accommodate indeterminate, incomplete, and inconsistent information. It introduces the concepts of truth-membership, falsehood-membership, and indeterminacy membership degrees, providing a more flexible and nuanced representation of reality.

Neutrosophic set

Neutrosophic set theory generalizes classical set theory to handle indeterminate elements. A neutrosophic set allows for the inclusion of objects with indeterminate membership degrees, acknowledging the uncertainty inherent in defining clear boundaries for certain concepts.

Neutrosophic probability

Neutrosophic probability generalizes classical probability theory to address situations where uncertainty, indeterminacy, and ambiguity play a crucial role. It provides a framework for dealing with incomplete information and reflects the imprecision inherent in various real-world scenarios, having three sub-functions: chance that an event occurs, indeterminate-chance that the event occurs, and chance that the event does not occur.

Beyond binary thinking

The interdisciplinary approach of neutrosophics challenges the binary nature of traditional Western philosophy and embraces the inherent complexity and ambiguity present in the world. While facing criticisms, neutrosophy and neutrosophics continue to stimulate intellectual discourse and contribute to our evolving understanding of uncertainty and ambiguity.⁶

The Neutrosophic Triad and the MultiNeutrosophy

Numerous schools of thought have extensively examined the dynamics between the opposites $[A]$ and $[\text{anti}A]$. These concepts are known by various names, including dialectics, Yin-Yang, Manichaeism, dualism, Dharma-Adharma, and many others. However, the neutral (or indeterminacy) part ($[\text{neut}A]$) between these opposites has rather either been ignored or retracted. The neutral or indeterminate, as I emphasized in my studies on neutrosophic theory [Smarandache 2002, 2013, 2017, 2019, 2021, 2023], usually intervenes in the dynamics (or conflicts) from one side or the other, tipping the balance in one direction or the other. The boundaries between the opposites can be either fluid (when there is some overlapping or indeterminate/neutral part between the opposites) or rigid (when $[A]$ and $[\text{anti}A]$ are clearly separated).

Therefore, I proposed the 'triadic balance', emphasizing the interconnectedness of opposites. The triad – $[\text{truth}]$, $[\text{indeterminacy}]$, $[\text{falsity}]$ – forms the cornerstone of the Neutrosophic system of thought. For every element “ x ” in a neutrosophic triplet set A , there exists a neutral of “ x ” and an opposite of “ x ”. Also, the neutral of “ x ” must be different from the classical neutral element. [Smarandache, Sahin]

The MultiNeutrosophy is a multiplied neutrosophy, focusing on the dynamics between $G = \{A_1, A_2, \dots, A_n\}$ and its opposite $G = \{B_1, B_2, \dots, B_m\}$, with their neutrals $G = \{C_1, C_2, \dots, C_r\}$.

Let us give some simple examples of MultiNeutrosophy:

- A group of countries against another group of countries (First and Second World Wars), while the third group of countries still remain neutral.
- A group of ideas against another group of ideas in philosophy, literature, science, culture, religion.

⁶ Otay, İ., & Kahraman, C. (2019). “A state-of-the-art review of neutrosophic sets and theory.” *Fuzzy multi- criteria decision-making using neutrosophic sets*, pp. 3–24. Springer.

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- A basketball team vs. another basketball team (as opposite groups), and the neutral group (formed by the referees and the supporters, while the supporters may be split into supporters of the first team, supporters of the second team, and undecided supporters).

The MultiAlist System

In an essay,⁷ I delineated a MultiPolar System that is open to combinations of opposites and neutrals (indeterminacies). The MultiPolar System is an extension of the PluriPolar System. The UniPolar, BiPolar, TriPolar, and PluriPolar systems are uni-valent (one excludes the other), but the MultiPolar System is multi valent (it contains more than one system) and admits neutrality and indeterminacy between opposites.

The MultiAlism is an open, dynamic system with indeterminacies or neutralities, formed by elements from many systems, exceeding the PluriAlism, which is a closed dynamic system without indeterminacies, a uni system formed by elements from a single system.

Unclear Conceptual Borders

Let us underline the blur borders between opposite or partially opposite concepts. Given the fact that the boundaries between concepts are frequently hazy, it is conceivable that $[A]$, $[neutA]$, $[antiA]$ (and $[nonA]$ naturally) share two by two, or even all three of them, common parts.

The Law of Included Multiple-Middle

I generalized (in Smarandache 2014) the Law of Included Middle (Lupasco-Basarab): $[A]$, $[nonA]$, and a third value $[T]$ which resolves their contradiction at another level of reality $[Brenner]$. Law of Included Multiple-Middle ($[A]$, $[antiA]$, $[neutA]$, where $[neutA]$ is split into a multitude of Neutralities between $[A]$ and $[antiA]$, such as $[neut_1A]$, $[neut_2A]$, etc.). The $[neutA]$ value (i.e., Neutrality or Indeterminacy related to $[A]$) actually comprises the included middle value. Also, the Principle of Dynamic Opposition (opposition between $[A]$ and $[antiA]$) is extended to the Principle of Dynamic Neutrosophic Opposition (which means oppositions among ($[A]$, $[antiA]$, and $[neutA]$)). $[Smarandache 2014]$

⁷ See “The MultiAlist System of Thought,” pp. 175-188 in Florentin Smarandache: **Toward a New Paradigm. Insights into Neutrosophic Philosophy. A series on Neutrosophic Philosophy**, no. 1, NSIA Publishing Gallup, NM, USA / Guayaquil, Ecuador, 2025.

The law of included infinitely-many-middles

In between the opposites $[A]$ and $[anitA]$ there are infinitely many middles, denoted by $[neutA_i]$, where $i = 1, 2, \dots, \infty$.⁸

Let us take a practical example: between $[White]$ and $[Black]$, there are infinitely many nuances of colors.

- Between 100% True and 100% False, there are included infinitely many middles, which are truth-values of the form: $d\%$ True and $(1-d)\%$ False, thus a logical proposition may be, for example, 1% True and 99% False, 2% True and 98% False, etc., where $d \in (0, 1)$.
- Similarly, between 100% Membership and 100% Nonmembership, there are included infinitely many middles of the form: $d\%$ Membership and $(1-d)\%$ Nonmembership.

Sorites Paradoxes

Sorites paradoxes are a class of paradoxes that arise from the indeterminacy surrounding the vague boundaries of concepts. Let us remind the classic example of the paradox of the heap:

- Start with a heap of sand.
- If you remove one grain, the heap remains a heap.
- Repeat this process: removing one grain at a time.
- At some point, you'll be left with just a few grains.
- The question is, at what point does the heap stop being a heap?

The paradox highlights the difficulty in defining when a $[heap]$ becomes a $[non\text{-}heap]$.

The problem arises from the inherent lack of preciseness in everyday concepts. Similar paradoxes can be constructed for other vague concepts like 'tallness', 'baldness', 'age', and so many more. These paradoxes challenge traditional approaches to logic and set theory, which often assume clear-cut distinctions between categories.

They raise questions about the nature of linguistic vagueness and how we handle it in logical reasoning $[Williamson]$, $[Shapiro, Snyder]$. Various solutions and theories have been proposed to address sorites paradoxes $[Akerman]$, including:

⁸ Smarandache, Florentin (2023). "Law of included infinitely-many-middles within the frame of neutrosophy." *Neutrosophic sets and systems*, 56:1-4. DOI: 10.5281/zenodo.8194681. https://digitalrepository.unm.edu/nss_journal/vol56/iss1/1

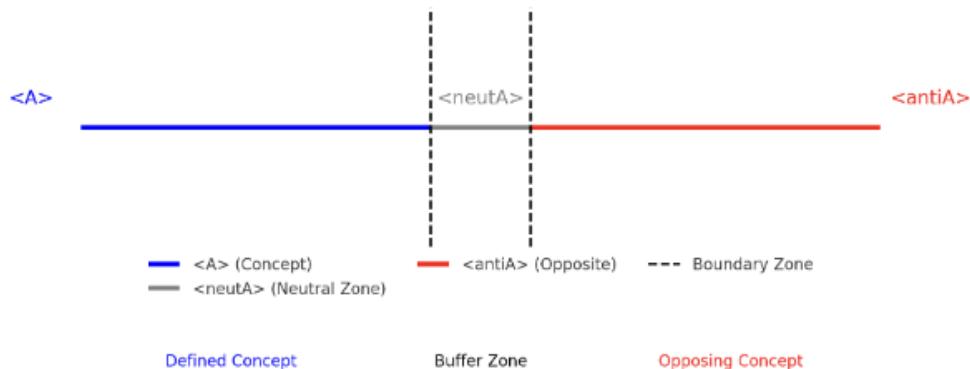
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- *Degree theories*: vague predicates should be understood in terms of degrees or degrees of membership.
- *Supervaluationism*: a statement can be true, false, or indeterminate, allowing for multiple acceptable precisifications of vague terms.
- *Contextualism*: the meaning of vague terms depends on the context of their use, and the boundaries of concepts can shift based on the context.
- *Many-valued logic*: instead of the classical two-valued logic (true or false), many-valued logics introduce more than two truth values, accommodating the intermediate or fuzzy states between true and false.

Neutrosophic interpretation

The Sorites Paradoxes, therefore such paradoxes where between two opposite entities there is not a clear frontier, can be interpreted neutrosophically in the following way: one considers a buffer zone, $\llbracket \text{neutA} \rrbracket$ (or neutral, indeterminacy), between the opposites. There is not a clear distinction between some opposites $\llbracket A \rrbracket$ and $\llbracket \text{antiA} \rrbracket$, where $\llbracket A \rrbracket$ is a concept and $\llbracket \text{antiA} \rrbracket$ its opposite, but a buffer zone, $\llbracket \text{neutA} \rrbracket$.



Graph 15. **Neutrosophic Representation of $\llbracket A \rrbracket$, $\llbracket \text{antiA} \rrbracket$, and $\llbracket \text{neutA} \rrbracket$**
This graph expands on the neutrosophic interpretation of opposites by visualizing:

- $\llbracket A \rrbracket$ (*Concept*): A defined, clear idea on the left side (blue).
- $\llbracket \text{antiA} \rrbracket$ (*Opposite*): Its direct opposite on the right side (red).
- $\llbracket \text{neutA} \rrbracket$ (*Neutral Zone*): The ambiguous or buffer zone in between, where neither $\llbracket A \rrbracket$ nor $\llbracket \text{antiA} \rrbracket$ fully dominates (gray).
- *Boundary Zones*: Representing the transitional or indeterminate points between $\llbracket A \rrbracket$, $\llbracket \text{neutA} \rrbracket$, and $\llbracket \text{antiA} \rrbracket$ (dashed black lines).



There are three zones: a zone that for sure represents $[A]$, a second zone that for sure represents $[antiA]$, and an ambiguous/unclear/vague zone that represents $[neutA]$, the neutral or indeterminate zone (neither $[A]$ nor $[antiA]$; or $[A]$ and $[antiA]$ simultaneously). Therefore, a universe of discourse has a neutrosophic partition with respect to the frontier between opposites.^{9, 10}

Neutrosophic sorites paradoxes

Between $[A]$ and $[neutA]$, there is not a clear frontier – this is the first neutrosophic paradox (NSP1). Then, between $[neutA]$ and $[antiA]$, there is not a clear frontier – this is the second neutrosophic paradox (NSP2).

MultiSorites paradoxes

MultiSorites paradoxes—within the frame of Refined Neutrosophy (which is isomorphic to the MultiNeutrosophy)—has n -dimensional form: $T_1, T_2, \dots, T_p, I_1, I_2, \dots, I_r, F_1, F_2, \dots, F_s$, where p, r, s are integers ≥ 0 , and at least one of p, r, s is ≥ 2 to assure the refinement (or multiplicity), $p+r+s = n$, where each T_j, I_k, F_l are refined (or respectively multi) Truth / Indeterminacy / Falsehood. The frontiers between all these n sub-, or multi-components, taken two by two, are blurry, unclear, and fluid.

There are $C(n, 2)$ (combinations of n taken by 2) = $n(n+1)/2$ Refined/MultiNeutrosophic Sorites Paradoxes.

Exploring the Interplay between Zoroastrianism and Neutrosophy

Zoroastrianism traces its origins to the teachings of the prophet Zarathustra (*Zoroaster*). This ancient belief system, originating in Persia (modern-day Iran), emphasizes the eternal (dynamic) struggle between good and evil, light and darkness. Zarathustra delivered his teachings in a world where duality played a central role. The core tenets of Zoroastrianism revolve around the eternal conflict between *Ahura Mazda*, the supreme deity

⁹ Smarandache, F. (2005). "Quantum quasi-paradoxes and quantum sorites paradoxes." *Progress in physics*, 1(1), 7–8. <https://fs.unm.edu/PP-01-02.pdf>

¹⁰ Boyd, R. N. (2019). "Resolution of the Smarandache quantum paradoxes." *Progress in physics*, 15(3), 182–184. <https://fs.unm.edu/ResolutionOfTheSmarandache.pdf>

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representing goodness and truth, and *Angra Mainyu*, the destructive force embodying falsehood and evil. This cosmic battle, reflected in the opposing principles of *asha* (truth) and *druj* (falsehood), mirrors the fundamental dualities inherent in existence but also the neutrosophic zone that spans from *asha* to *druj*.¹¹ In the Zoroastrian context, the neutrosophic triadic balance finds resonance in the perpetual interplay of good, evil, and the ambiguous space between them.

Edalatpanah comment:¹² “The juxtaposition of Zarathustra's teachings on the concepts of good and evil with the principles of neutrosophy, which focuses on neutrality and the spectrum of ideational phenomena, promises to open new avenues of interpretation for these ancient teachings.” Zarathustra's vision of cosmic order and moral responsibility aligns with the Neutrosophic notion that truth, falsity, and indeterminacy are interconnected and inseparable. The prophet's teachings emphasize the need for individuals to actively participate in the eternal struggle for righteousness, acknowledging the complexities and uncertainties inherent in their choices.

Zarathustra's Neutrosophic God

Zarathustra introduced a conception of the divine that transcends the conventional binary notions often associated with gods. Central to Zarathustra's philosophy is the idea that God embodies both masculine and feminine attributes and that existence is a dynamic relationship between the opposites $[A]$ and $[\text{anti}A]$, which mirrors the principles of neutrosophy.

Furthermore, Zarathustra's conception of God challenges the omnipotence and omniscience traditionally ascribed to divine beings. Instead of an all-knowing and all-powerful deity, Zarathustra's God is portrayed as a creator of a dynamic universe—one in constant flux and progression towards perfection. This aligns again with the neutrosophic notion that reality is inherently indeterminate, incomplete, and evolving.

The dynamics of $[A]$ (Good) and $[\text{anti}A]$ (Evil) in Zarathustra's worldview are crucial elements in understanding the neutrosophic nature of his God, reflecting a reality where good and evil coexist in various degrees. The universe, in this view, is a dynamic interplay between opposing forces,

¹¹ Duchesne-Guillemin, J. (2024). *History & society Zoroastrianism religion*. <https://www.britannica.com/topic/Zoroastrianism>

¹² I would like to express my sincere gratitude to S.A. Edalatpanah, whose comment, cited above, on ResearchGate (S.A. Edalatpanah, ResearchGate, 04 December 2023)—, as well as further discussions inspired the present exploration.

with outcomes ranging from partially good and partially evil to states of complete neutrality where the degrees of goodness and evilness nullify or balance each other. This perspective has profound implications for ethical considerations within Zoroastrianism. Instead of viewing morality in absolute terms, Zarathustra's framework suggests a more nuanced understanding, similar to neutrosophic architecture. It invites followers to navigate the intricate web of existence, recognizing that moral judgments may fall within the spectrum of what neutrosophy calls [neutA] , where actions and intentions are not strictly defined as wholly good or wholly evil.

Zarathustra's philosophical canvas expands further as we delve into the rhythmic and dynamic nature of existence. In his vision, everything follows a ceaseless succession of changes, akin to the principles of neutrosophy that acknowledge the inherent indeterminacy and evolution in all aspects of reality. The rhythmic nature of existence implies a perpetual dance between opposites, where the divine, being neutrosophic, orchestrates the symphony of creation.

Therefore, Zarathustra's emphasis on progress echoes the neutrosophic principle that nothing is static. In this dynamic universe, progress is not merely an option but a necessity. Stagnation, as Zarathustra implies, can lead to misery—an idea consonant with the neutrosophic understanding that acknowledges the potential consequences of resisting change and growth. The neutrosophic God encourages continuous evolution, fostering a universe in a state of perpetual becoming.

The concept of self-dominance introduces a dimension of personal responsibility within Zarathustra's philosophy. This self-mastery is crucial in navigating the dynamic interplay of [A] and [antiA] , contributing to the harmonious progression towards perfection. Evolution is not merely a biological concept but a cosmic principle guiding the continuous refinement and enhancement of all existence. Perfection, in this context, is not a static state but a dynamic journey towards an ideal.

The idea that immortality means “behind time” adds a layer of profundity to Zarathustra's philosophy. It aligns with the neutrosophic understanding that time is not a linear constraint but a dynamic dimension where existence transcends conventional temporal boundaries.¹³

Summarizing, Zarathustra's God —an orchestrator of the ceaseless rhythm and progression inherent in existence— is neutrosophic.

¹³ Boyce, M. (1982). *A history of Zoroastrianism*, Volume two: *Under the achaemenians*. Brill.

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Happiness in suffering

Zarathustra's message, "Happiness is for the one who makes others happy," exhibits neutrosophic characteristics by acknowledging the indeterminacy, incompleteness, and dynamic interplay of opposites inherent in the concept of happiness [Humbach, Ichaporia], [Insler]. Let us briefly interpret it from a neutrosophic point of view.

Indeterminacy of happiness

Neutrosophy acknowledges the indeterminacy present in many concepts, including happiness. The idea that happiness is for the one who makes others happy introduces an element of uncertainty. What brings happiness to one person may not necessarily bring happiness to another, and the factors contributing to happiness can vary widely.

Incompleteness in the pursuit of happiness

Neutrosophy suggests that the pursuit of happiness is an incomplete endeavor. Happiness is not an absolute state but exists on a spectrum with varying degrees of fulfillment. The message implies that one's happiness is intimately connected to the happiness of others, indicating that a holistic understanding of happiness may involve a broader and more interconnected perspective.

Dynamic interplay of giving and receiving

The message emphasizes a dynamic interplay between giving and receiving happiness. Neutrosophy recognizes that this interaction is not a one-dimensional process but a complex, evolving exchange. The act of making others happy and, in turn, experiencing happiness oneself suggests a dynamic and reciprocal relationship.

Balance between opposites

Neutrosophy explores the balance between opposites. In the context of this message, the happiness of the individual is intricately linked to the happiness of others. This interdependence highlights the dynamic balance between self-interest and the well-being of the community, challenging the idea of happiness as a purely individual pursuit.

Degrees of happiness

Neutrosophy introduces the idea of degrees in various phenomena, and happiness is no exception. The message implies that the happiness derived from making others happy can manifest in different degrees. It might range from partial fulfillment to a more complete and harmonious state where the happiness of the individual and others reinforce each other.

Chinvat bridge

Roughly, in theology, the soul is described as the component of the individual that shares divinity and is commonly thought to survive the death of the body. Different faiths and philosophers have created various theories and beliefs about its nature, relationship to the body, origin, and mortality.

The Egyptian *ka* (breath) survived death but remained near the body, but the spiritual *ba* traveled to the realm of the deceased.

The Chinese made a clear distinction between a perishable, sensitive soul that ceases with death and a reasoning principle that endures beyond death.

Biblical mentions of the soul associate it with the concept of breath, not differentiating between the ethereal soul and the physical body [Crane, Patterson].

In Christian theology, St. Augustine characterized the soul as a 'rider' on the body, underscoring the separation between the material and immaterial aspects, where the soul is regarded as the authentic essence of the individual.

In addition to the body (*tanu*), it was considered that an individual comprised of a number of spiritual aspects, loosely classified as souls. There are six elements: the animating force, the breath of life, the mind or spirit, the soul, the protecting spirit, and the spiritual double: *ahu*, *vyana*, *manah*, *ruvan*, *fravashi*, *daina*.

When a person is born, the essence (*fravashi*) incarnates the soul (*ruvan*) into the body to experience the material world, i.e., to suffer and fight bad powers to make decisions about good and evil. Therefore, *ruvan* actively participates in the manifestation of free will. It should be noted that *fravashis* are classified into three groups, with the central element composed of uncertainties and neutralities: [the living], [the yet-unborn], and [the dead].

At death, *ruvan* was considered to dwell on earth for a few days while the gods assessed the deceased's life, and then was reunited with its *fravashi* and journeyed to the Chinvat Bridge, which spans the gulf between the living and the dead.¹⁴ This bridge has neutrosophic qualities: when the righteous soul starts crossing, it becomes larger and larger, up to thirty-seven' poles' long and wide (equal to nine 'lances' or one 'frasang').

¹⁴ Boyce, M. (1968). "On the sacred Fires of the Zoroastrians." *Bulletin of the school of oriental and African studies*, 31(1), 52–68. DOI:10.1017/S0041977X00112789.

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Au contraire, it becomes narrower and narrower to a razor blade dimension when the wicked soul steps onto the bridge, falling into hell because of the bridge's coarseness and sharpness.¹⁵ In other words, the Chinvat Bridge's size is an open dynamic system with indeterminacies or neutralities, therefore, a MultiAlist System.

In MultiAlism, one has dynamics between many neutrosophic triads:
 $([\text{A}_1], [\text{neutA}_1], [\text{antiA}_1]), ([\text{A}_2], [\text{neutA}_2], [\text{antiA}_2]), \dots$

Granulating the Six Attributes of Ahura Mazda

Ahura Mazda, the supreme deity in Zoroastrianism, and the attributes¹⁶ associated with Ahura Mazda are traditionally understood in a more qualitative and symbolic manner rather than as precisely defined attributes. However, here is an attempt to apply the concept of fuzzy information granulation to break down these attributes into groups of three granules, recognizing the inherent vagueness and imprecision in understanding:

Good mind

Vohu Manah (Good Mind) signifies the divine attribute of good thought, understanding, and mental clarity:

Granule 1: positive and constructive thought processes.

Granule 2: spiritual awareness and enlightenment.

Granule 3: the divine intellect influencing human understanding.

Righteousness

Asha Vahishta (Best Truth) embodies the divine principles of righteousness, truth, and order in the universe:

Granule 1: moral and ethical perfection.

Granule 2: harmony and balance in the cosmic order.

Granule 3: just and fair governance of the world.

Divine power

Khshathra Vairyā (Desirable Dominion) represents the divine power and authority that upholds the cosmic order:

¹⁵ Zaehner, R. C. (1955). "Postscript to *zurvān*." *Bulletin of the school of oriental and african studies*, 17(2), 232–249. DOI:10.1017/S0041977X00111711.

¹⁶ The Editors of Encyclopædia Britannica. (2024). *History & society Ahura Mazdā Zoroastrian deity*. <https://www.britannica.com/topic/Ahura-Mazda>. Accessed 2 March 2024

Granule 1: sovereignty and authority over creation.

Granule 2: manifestation of divine power in the world.

Granule 3: control and protection of the cosmic order.

Holy spirit

Spenta Mainyu (Holy Thought) represents the divine aspect of wisdom, creativity, and positive mentality:

Granule 1: knowledge and understanding of the universe.

Granule 2: divine intelligence guiding creation.

Granule 3: insight into the cosmic order.

Perfection

Haurvatat (Wholeness) stands for the divine quality of completeness, health, and perfection:

Granule 1: spiritual purity and holiness.

Granule 2: devotion to the divine principles.

Granule 3: connection with the divine through rituals and worship.

Immortality

Ameretat (Immortality) symbolizes the divine attribute of eternal life, immortality, and perpetuity:

Granule 1: eternal and unchanging nature.

Granule 2: perpetuity of divine existence.

Granule 3: endless life and vitality.

It's important to note that these granules are created for illustrative purposes and to highlight the fuzzy nature of these attributes. The attributes of Ahura Mazda are deeply rooted in the religious and philosophical context of Zoroastrianism, and attempting to granulate them introduces a level of interpretation and approximation due to the abstract and symbolic nature of these concepts that consequently fall under a MultiAlist system.

Instrumenting the Zoroastrianism: Cyrus the Great

The historical dynamics of social classes, encompassing the neutrosophic triad [SuperClass, MiddleClass, LowerClass], have significantly shaped the course of societies, both developed and less developed. The [SuperClass] is the upper class, above the law, enjoying all privileges. The [MiddleClass] and the [LowerClass] are the classes on which the laws act with the crudest harshness and which suffer most of the time.

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The influence of these social classes becomes particularly evident when examining the reign of Cyrus the Great and the impact of Zoroastrian principles on governance.

The influence of Zoroastrianism on the cultural, social, and political fabric of the region is profound, with Cyrus the Great emerging as a central figure in the historical narrative of this faith. Cyrus the Great played an instrumental role in shaping and propagating Zoroastrianism. Cyrus, the founder of the Achaemenid Empire, ruled Persia from 559 to 530 BCE. His reign was not only marked by military conquests but also by a visionary approach to governance, which incorporated Zoroastrian principles into the administrative framework of his vast empire. One of the key tenets of Zoroastrianism is the concept of *asha*, representing 'truth' and 'righteousness'. Cyrus incorporated these ideals into his governance philosophy, promoting justice, fairness, and religious tolerance.¹⁷

The Cyrus Cylinder, a clay cylinder inscribed with Akkadian cuneiform script, stands as a testament to Cyrus's commitment to Zoroastrian principles. This ancient artifact, often hailed as the first charter of human rights, outlines Cyrus's policies of religious freedom and the repatriation of displaced peoples. It reflects the Zoroastrian concept of *Vohu Manah*, the 'good mind', as Cyrus exhibited a forward-thinking and inclusive approach to ruling a diverse empire.¹⁸

Cyrus's conquest of Babylon in 539 BCE is another pivotal moment where Zoroastrian influence can be observed. His respect for local customs and religions, as documented in the Cyrus Cylinder, contrasts with the imperial norms of the time. This approach not only facilitated a smooth transition of power but also laid the groundwork for the cultural and religious diversity that characterized the Achaemenid Empire. The Achaemenid Empire under Cyrus set an example of religious tolerance that was not only ahead of its time but also instrumental in the propagation of Zoroastrianism. While Cyrus himself was a follower of the traditional Iranian religion, he extended respect and patronage to various faiths within his realm.

¹⁷ Frye, R. N. (2024). *History&Society Cyrus the Great king of Persia*. <https://www.britannica.com/biography/Cyrus-the-Great>

¹⁸ Schmitt, R. (2010). "The Cyrus cylinder and ancient persia: new perspectives on Iran's past." British Museum Press.

This ethos of inclusivity —a MultiAlist trait— in line with Zoroastrian ideals contributed to the empire's stability and the coexistence of diverse religious communities.

Cyrus's legacy as an instrument of Zoroastrianism extends beyond his lifetime. His successors, including Darius the Great and Xerxes, continued to uphold Zoroastrian principles in their rule. The construction of Persepolis, the grand ceremonial capital of the Achaemenid Empire, serves as a tangible expression of the empire's commitment to the divine attributes of *Khshathra Vairyā* (Desirable Dominion) and *Haurvatat* (Wholeness).

This monumental project symbolized a departure from the exclusive privileges of the SuperClass and a move toward a more inclusive and balanced society. The SuperClass, traditionally above the law, witnessed a shift towards a more just and compassionate governance. The MiddleClass and LowerClass, instead of enduring harsh treatment, found relief and consideration in the policies of Cyrus, reflecting the influence of Zoroastrian ideals on societal dynamics and governance.

A multipolar thinking

Cyrus the Great, the ancient Persian ruler, laid the foundation for a governance model that embraced diversity and promoted unity within a vast empire. Fast forward to the contemporary world, and we find ourselves in a MultiPolar World with distinct geopolitical poles, such as the United States, European Union, China, Russia, India, and Brazil. Cyrus's legacy of inclusive governance serves as *a historical precursor to the modern concept of MultiPolar Thinking*.

The idea of “E Pluribus Unum” (Out of Many, One), embraced by the European Union, has evolved into a more complex narrative in our MultiPolar World.

The question arises: Should it now be “E Pluribus Multa” (Out of Many, Many)? Or perhaps “E Pluribus Omnia” (Out of Many, Everything)? The dynamics of a MultiPolar World encourage us to consider alternative spectra, such as “Ex Uno Omnia” (From One, Everything), “Ex Uno Plures” (From One, Many), or even “Ex Uno Multa” (From One, Many Things).

The shift towards “E Pluribus Plures” (Out of Many, Many) appears to be a consequence of contemporary global geopolitics, a phenomenon predicted by experts decades ago.

The world is no longer characterized by a single dominating power but by multiple centers of influence, each contributing to the intricate

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tapestry of global affairs.¹⁹ In this MultiPolar World, identity politics emerges as a notable fracture line in modern societies. As nations navigate the complexities of coexistence within this globalized framework, the question of identity becomes crucial.

The diversity inherent in MultiPolar Thinking requires societies to grapple with the challenges and opportunities posed by various identities, be they cultural, political, or economic. The MultiPolar Thinking encourages a departure from a unipolar or bipolar worldview and necessitates embracing the complexity of a world with multiple centers of power and influence.

Other Examples to be Explored

Gilgamesh: Two-Thirds God and One-Third Human

The legendary figure of Gilgamesh, as described in the ancient Mesopotamian Epic of Gilgamesh, is said to be two-thirds god and one-third human. [Maier] This unique composition provides an interesting lens through which we can explore Gilgamesh in the context of neutrosophy.

Two-thirds god

Traditional Understanding

The divine aspect of Gilgamesh symbolizes his connection to the gods, granting him exceptional strength, wisdom, and abilities beyond those of ordinary humans. This divine heritage represents his elevated status and sets him apart from mortal beings.

Neutrosophic Perspective

Within the neutrosophic framework, the two-thirds god aspect introduces an element of indeterminacy. It suggests that Gilgamesh's divine attributes are not absolute or fully defined. Instead, they exist on a spectrum, incorporating a degree of uncertainty and dynamic interaction with his human nature.

One-third human

Traditional Understanding

The human aspect of Gilgamesh represents his mortality, susceptibility to emotions, and capacity for personal growth and development. This human component adds a layer of relatability to his character, making him more accessible to the human experience.

¹⁹ Ravitch, D. (1990). "Multiculturalism E pluribus plures." *The American scholar*, 53(9), 337–354. <http://www.jstor.org/stable/41211801>. Accessed 3 March 2024.

Neutrosophic Perspective

The one-third human aspect introduces a sense of incompleteness within Gilgamesh. Neutrosophy suggests that his humanity is not a fixed state but a dynamic element that interacts with his divine attributes. This interplay creates a complex and evolving character whose actions and decisions reflect the inherent indeterminacy of the human condition.

Dynamic interplay

Traditional Understanding

The combination of divine and human elements in Gilgamesh creates a powerful and multidimensional character. His journey, marked by quests for immortality and self-discovery, reflects the struggle to reconcile his dual nature.

Neutrosophic Perspective

Neutrosophy emphasizes the dynamic interplay of opposites. In the case of Gilgamesh, the constant interaction between his godly and human attributes illustrates the indeterminacy inherent in his character. His decisions, motivations, and the outcomes of his actions are not predetermined but exist within a realm of constant flux and evolution.

Dharma-Adharma and Karma

The concepts of Dharma, Adharma, and Karma are fundamental aspects of Hindu philosophy and are intricately woven into the fabric of life's ethical and moral considerations [Zaehner]. When explored within the context of neutrosophy, these concepts take on new dimensions, offering a nuanced perspective on the complexities of human existence.

Dharma

Traditional Understanding

Dharma is often translated as duty, righteousness, or cosmic order. It encompasses the moral and ethical principles that govern one's conduct and responsibilities in life. Dharma provides a framework for living in harmony with the universe and upholding virtuous actions.

Neutrosophic Perspective

Neutrosophy acknowledges the indeterminacy in ethical decisions. Dharma, within this context, is not a rigid set of absolutes but a dynamic principle that navigates the opposites. The determination of what is righteous may contain elements of indeterminacy, and the degree of righteousness may exist on a spectrum rather than in binary terms.

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Adharma

Traditional Understanding

Adharma represents actions that go against the moral and ethical order. It signifies behaviors that disrupt harmony, create imbalance, and violate the principles of righteousness.

Neutrosophic Perspective

Adharma, in the neutrosophic framework, recognizes the inherent incompleteness in labeling actions as solely right or wrong. The dynamic interplay between Dharma and Adharma suggests that ethical evaluations may involve degrees of indeterminacy, reflecting the complex nature of human choices.

Karma

Traditional Understanding

Karma is the law of cause and effect, where actions have consequences that may manifest in this life or future incarnations. Positive actions lead to positive outcomes (good karma), while negative actions result in negative consequences (bad karma).

Neutrosophic Perspective

Karma, within the neutrosophic lens, acknowledges the dynamic nature of consequences. The law of cause and effect is not deterministic but exists within a framework of indeterminacy. Actions may yield outcomes that fall within a spectrum of possibilities, reflecting the neutrosophic principle that nothing is absolute and everything exists in a state of constant evolution.

The Logic of Diamond Sutra

The Diamond Sutra —known as the Vajracchedikā Prajñāpāramitā Sūtra (“Perfection of Wisdom in 700 Lines”), believed to have been composed in the first century CE, making it one of the earliest known dated printed texts—is a central text in Mahayana Buddhism, particularly within the Zen and Chan traditions.

The Diamond Sutra takes the form of a dialogue between the Buddha and Subhūti. The discourse occurs in the context of a larger discussion on the nature of wisdom and the path to enlightenment. The teaching style is characterized by paradoxical language, negations, and the deconstruction of conventional concepts. This style aims to lead the listener or reader beyond conceptual thinking to a direct experience of reality.

The Diamond Sutra emphasizes the transcendence of dualistic thinking, urging practitioners to go beyond concepts of self and other, existence and non-existence. It encourages a direct realization of the interconnectedness of all phenomena.²⁰

The Diamond emphasizes the concept of “emptiness” (*śūnyatā*) and the impermanence of all phenomena. Emptiness is not a nihilistic concept but rather an affirmation of the interdependence and interconnectedness of all things. The phrase “form is emptiness, emptiness is form” encapsulates this teaching, highlighting the dynamic and interrelated nature of reality. The logic embedded in the Diamond Sutra is more experiential and intuitive, aiming to lead individuals toward direct insight (*prajñā*) into the nature of reality.²¹

Toward a Neutrosophic Harmony of Opposites

In weaving together the tapestry of Zoroastrianism, the teachings of Zarathustra, and the philosophy of Neutrosophy, a rich interplay of ideas emerges. The eternal struggle between good and evil, truth and falsehood, finds expression in both ancient Persian theology and contemporary philosophical discourse. By embracing the triadic balance inherent in Neutrosophy, individuals can navigate the complexities of existence with a greater awareness of the interconnectedness of opposites, seeking a harmonious balance amidst the perpetual struggle. The Neutrosophic framework invites contemplation on the inherent ambiguity and complexity within seemingly binary oppositions. Just as Zoroastrianism acknowledges the ongoing struggle between Ahura Mazda and Angra Mainyu, Neutrosophy suggests that absolute clarity and certainty are elusive, and reality is often nestled in the indeterminate realm.

²⁰ Agócs, T. (2000). “The diamondness of the diamond sūtra.” *Acta orientalia academiae scientiarum hungaricae*, 53(1–2), 65–77. DOI:10.1556/aorient.53.2000.1-2.4

²¹ Nagatomo, S. (2000). “The logic of the diamond Sutra: A is not A, therefore it is A.” *Asian philosophy*, 10(3), 213–244. DOI:10.1080/09552360020011277

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Gratiarum Actio

I dedicate the foregoing hypotheses and inferences to the kind memory of Professor Zadeh, for his profound effect on a wide range of scientific and technical domains, but also for the connection he had with the cultural spaces to which this paper refers.²²



Lotfi Aliasker Zadeh (the father of fuzzy theories) and Florentin Smarandache (the father of neutrosophic theories) participated in the BISC FLINT-CIBI International Workshop on Soft Computing for Internet and Bioinformatics, which took place at the University of Berkeley, California, from December 15 to 19, 2003. In this context, I presented the paper "*Generalization of the Intuitionistic Fuzzy Set to the Neutrosophic Set*."

²² Trillas, E. (2011). "Lotfi A. Zadeh: On the man and his work." *Scientia Iranica*, 18(3), 574–579.

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In a world shaped by contradictions, uncertainties, and evolving paradigms, *Neutrosophic Philosophy* emerges as a groundbreaking framework that transcends binary thinking. Rooted in the study of neutralities, contradictions, and their dynamic interplay, this philosophy redefines classical logic, epistemology, and ontology, offering a comprehensive approach to understanding reality.

Through the lens of Neutrosophy, this book collects papers exploring fundamental concepts such as the **continuum of neutralities**, **equilibrium of ideas**, **thesis-antithesis-neutrothesis**, challenging traditional dialectical structures. It expands the boundaries of philosophy by integrating **mathematization**, **many-valued logics**, and **transdisciplinary approaches** to knowledge.

From **quantum mechanics and artificial intelligence** to **ethics, sociology, and literature**, the applications of Neutrosophy are vast and transformative. Whether reinterpreting paradoxes, reshaping philosophical foundations, or exploring the infinite nature of truth, this work paves the way for a new way of thinking—one that embraces ambiguity, indeterminacy, and the coexistence of opposites.

By bridging disciplines and introducing innovative principles such as **Neutrosophic Logic**, **Neutrosophic Social Evolution**, and **Neutrosophic Materialism**, this book serves as both a theoretical foundation and a practical guide for scholars, researchers, and thinkers seeking a deeper understanding of complexity in the modern world.

Neutrosophic Philosophy is not just an exploration of knowledge—it is an invitation to rethink the very essence of truth, reality, and human understanding.

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